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 I THINK it was universally accepted a few years ago that preventive medicine was merely one phase, amongst many, of medical and veterinary science, the special province in your profession of the medical officer of health, and in mine of the government veterinary officer, both aided in their diagnoses and provided with suitable <i>armamentaria</i> by the bacteriologist. But as the teachings of our profes-		 MEDICAL APPOINTMENTS VACANT, ETC.	208
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POINTS OF CONTACT OF HUMAN AND VETERINARY PREVENTIVE MEDICINE.¹

By H. R. SEDDON, D.V.Sc.,
Professor of Veterinary Science, University of Queensland.

I THINK it was universally accepted a few years ago that preventive medicine was merely one phase, amongst many, of medical and veterinary science, the special province in your profession of the medical officer of health, and in mine of the government veterinary officer, both aided in their diagnoses and provided with suitable *armamentaria* by the bacteriologist. But as the teachings of our profes-

sions have developed we find that the principles of preventive medicine are being applied by many other of our practitioners.

No longer do we regard preventive medicine merely as the field that the immunologist has so skilfully exploited, but we believe that the knowledge gained as a result of, say, the newer nutrition, has given us probably an even greater field in which the same principles can be successfully applied.

Though our aim is the same, namely, the building up and maintaining of an animal population free from disease, we both have serious handicaps; yet each of us has great advantages over the other.

For your part, you have the high value placed on human life, the ability to command strong financial help and very numerous practitioners of your science; as against these assets you have to contend with the liberty of the individual, which

¹ Read at a meeting of the Queensland Branch of the British Medical Association on September 2, 1938.

makes quarantine and effective isolation so difficult; the scepticism, indifference, procrastination, thoughtlessness and whims of an animal being, who, having volition, frequently prefers to do as he thinks best.

We have animals having no volition in such matters, though this is often counterbalanced by their owners' possessing the human frailties I have mentioned. Though the aggregate value of our domesticated animal population is high, this animal population is maintained solely that it may earn wealth, and economic considerations often determine the applicability of preventive measures, though scientifically sound. Our practitioners are few—too few, indeed, within this State for the work they should be doing. On the other hand, the great wealth invested in the animal industry permits full use to be made of such measures as quarantine; and the value of individual animals being low, it is possible to destroy a diseased subject to safeguard the health of the mass. Our greatest asset, however, is the ability by experimentation to study disease actually in the animal that concerns us.

Now a word or two about disease. You deal with one animal species; we commonly deal with seven—horses, cattle, sheep, pigs, dogs, cats and poultry. One, poultry, is practically omnivorous; two are carnivorous and three are herbivorous; whilst the remaining species, the pig, is truly omnivorous. Bearing that in mind, and also the fact that the food they receive in domestication is often very different from their natural alimentation, it is small wonder that for each species there are certain dietetic disorders that are host-specific; and even when we come to bacterial and parasitic diseases we frequently find a host specificity. Cattle, for example, readily contract tuberculosis, whereas that disease has never been detected in a single sheep in Australia, and less than a score of cases have been seen throughout the rest of the world. Sheep and cattle, having the same type of digestive system, may harbour the same parasites in the alimentary canal; but otherwise each species has its own particular worms. Thus are our troubles made manifold.

There are, of course, a number of diseases common to man and one or more of the lower animals; but it is fortunate, indeed, that most of the serious animal plagues, whether of man or of the lower animals, do not affect both man and domesticated animals.

It is indeed a comfort that diseases such as smallpox, plague, malaria, sleeping sickness and yellow fever cannot attack our livestock; and perhaps it is fortunate for you that the great animal plagues of other lands, such as foot-and-mouth disease, cattle plague and equine and bovine trypanosomiasis, or imported plagues, such as contagious bovine pleuropneumonia, canine distemper, tick fever of cattle, foot-rot of sheep, and fowl pox, cannot attack human beings.

A General Consideration of the Prevention of Disease in Stock.

Free as Australia is from most of the serious animal plagues of older lands, we enjoy this freedom only by the exercise of preventive medicine. We have rigid quarantine laws, based purely on health considerations, and in no way set up merely as an economic barrier.

We realize that in many cases it is not only directly by animals that we have to fear the introduction of disease, for the causative agent may gain entrance in other ways. Some of the worst diseases we fear may be carried by insects, and others are due to infective agents that can withstand refrigeration or remain alive for a comparatively long period in a dried condition. Thus the virus may be present in conserved meat products, or on such things as hay, straw packing, bags *et cetera*, contaminated by discharges from affected animals.

Though most of the diseases we fear attack the lower animals only, certain diseases, such as glanders, rabies, Mediterranean fever and tularemia, are infective also for the human subject.

The protection of Australia from these and from other exotic diseases of stock is a Commonwealth function; but for the purpose State veterinary officers are appointed Federal quarantine officers, and quarantine stations are maintained at the ports at which stock or animal products are allowed to be landed. This service is very closely linked with the human quarantine service.

What now are the measures we employ in Australia for the control of disease and for the safeguarding of the health of our stock? They are many; and the same processes, or their counterparts, are, I think, employed by you—all save one. We have the great advantage in that when an animal is diseased and a menace to its fellows, we can compel its destruction. Such destruction is undertaken, however, only when isolation cannot be fully accomplished, and as a means of preventing infection of other stock. At times it has been applied to a group of infected animals, for example, to a herd or flock. This "stamping-out" policy has been called the policy of despair; but in cases in which it is applicable it is the most economic in the long run, since by it a disease can be prevented from becoming endemic.

Where a residual infection will not remain, such as soil infection or carrier animals, quarantine is often imposed; and by such means the infection is localized until it is overcome and neighbouring flocks or herds are protected. Naturally it is not popular with the owners whose stock is quarantined; but it is salutary, inasmuch as it prevents movement of infected stock, particularly to market, for owners frequently have a fervent desire to be quit of diseased animals.

Many diseases are notifiable; but unfortunately owners sometimes defeat our object by hiding their trouble, often bringing additional loss on themselves and others. Important aids are the regis-

tion of cattle, sheep and pig brands, and the permit system for travelling stock. Designed first to prevent cattle-stealing, these have proved invaluable aids in the tracing of diseased animals and contacts, since all travelling stock must be accompanied by a permit showing the brands of the animals.

These measures are enforced under acts of the State legislatures and are policed by officers of the State departments of agriculture. Thus stock inspectors, working under veterinary supervision, are ever on the watch, on the one hand for diseases that may infect other stock, and on the other hand for diseased animals that might endanger human health. They thus exert a firm control over clinical cases of these diseases, whilst by means of certain biological tests many cases of occult disease are detected.

Animals slaughtered for human consumption at the capital cities are subject to rigorous inspection, and meat for export must be from licensed establishments and subject to Commonwealth inspection. In some States the local inspector of stock is also inspector of slaughterhouses and meat; but in others there is no inspection at country slaughterhouses. Herein we are much behind many other countries, where killing is centralized in municipal abattoirs. There is not, however, any emergency killing of animals, such as exists in Europe; there a sick animal may be killed and dressed by a farmer and then presented for inspection. This means that we are spared the high incidence of food poisoning from salmonella infection that obtains in other countries, an incidence that would be even higher if it were not for the fact that bacteriological examination of such carcasses is now usually conducted.

A considerable measure of control can be exercised in the case of most diseases; but only some are of such a nature that we may hope to eradicate them; the others may merely be prevented. Even so, the success achieved in some of the latter has led to their becoming so rare that they have been vanquished, if not actually banished. It is necessary, however, to employ preventive measures constantly to ensure a continuance of this happy state of affairs.

Certain stock diseases have been eradicated from Australia in the past, but, except in the case of one, before they had become endemic here, though a certain degree of spread had occurred. We may therefore confine our attention to diseases which, having been present here for decades, are now firmly established, and which are at present the subject of eradication measures. It must be confessed that, in comparison with what has been and is being done in certain other countries, our efforts are as yet puny. Nevertheless these diseases are being tackled, and as efforts become intensified so will results accrue.

Some of these diseases are of purely veterinary importance; but others are of interest to you, inasmuch as human beings may suffer from them.

Diseases Communicable to Man.

Bovine Tuberculosis.

In bovine tuberculosis we have to deal with a disease which is not only a menace to man, but which in the aggregate causes tremendous loss in the dairying and pig-raising industries. It is an insidious disease, with a high incidence of infection unless checked; yet it is not a fatal disease in the ordinary sense, or its control would be much simplified.

The majority of cases are not recognizable clinically; yet many of these animals may be voiding infective material. Our trouble comes chiefly from the tuberculous cow, which may excrete the bacilli in the milk. The milk, as either whole milk, skim milk or whey, is commonly fed back to pigs. This procedure leads to infection of these animals, and results in condemnation of their carcasses for human consumption, as either pork or bacon.

Amongst cattle the disease is spread by the ingestion of pasture contaminated by bacilli voided by expectoration or, more commonly, in the faeces. The incidence amongst cattle varies considerably; but naturally it is greater where animals are congregated together. Thus it is high among dairy cows, but is not unknown amongst station bullocks, even though the land carries only, say, thirty animals to the square mile.

Some recent surveys of dairy cattle have shown that the average incidence in Australia is about 5% to 6%. Whilst in some herds it is, of course, considerably higher, it is good to know that a large proportion is entirely free.

The following figures may be of interest:

Victoria: Of 30,000 cows supplying Melbourne, a few herds having previously been tested and the reactors eliminated, 6.3% are tuberculous. Of 4,600 cows from 107 herds taken at random in three country districts, 5.9% were reactors. Fifty-seven of these 107 herds were free from tuberculosis.

New South Wales: Of 25,000 dairy cows supplying Sydney, some herds having previously been tested and the reactors eliminated, 4.1% reacted.

In other States figures are available only for fewer animals. They are as follows:

Western Australia: Reactors numbered 5% to 15% of dairy cows in the metropolitan area, and 2% to 5% in the country.

South Australia: Reactors numbered 6% of dairy cattle.

Queensland: Reactors numbered 6% to 8% of dairy cows in the Brisbane district, 1% on the Darling Downs, 3% at Townsville, 1% on the Atherton tableland.

We thus come to the following conclusions: (a) that there is much less tuberculosis here than in older countries of the world; (b) that the average incidence in purely dairying districts is approximately 6%; (c) that even in dairying districts a large proportion of the herds may be entirely free; (d) that in many dairying districts in Queensland the incidence is very low.

Bovine tuberculosis is a disease that can be eradicated, though naturally its eradication will be a costly procedure. In the tuberculin test we have a reliable diagnostic method, capable of

effecting the detection of infected animals, even though the infection is merely a single small focus in a lymphatic gland. The cost, therefore, is the expense of testing, the sacrifice of the monetary value of reactors that are destroyed, and the payment for animals for replacement.

Certain schemes of eradication have been put into operation. There is, first, the voluntary tuberculosis-free herd scheme. In this all cattle are tested and retested as may be necessary until the herd is free from the disease. The owner bears the cost of animals condemned and of replacements, and sometimes the cost of testing, though commonly this has been carried out without charge by the State to encourage the scheme. This is the only scheme so far put into operation in Queensland. Whilst it affords great assistance to the individual owner, and, if he is a milk supplier, allows of a tuberculosis-free milk supply, unless widely adopted it accomplishes little towards the eradication of the disease.

Next there is the tuberculosis-free milk supply scheme. Under this, all dairymen supplying milk to, say, a city are required to supply only the product of tuberculosis-free cows. This provision, in so far as raw milk is concerned, has been put into operation for the metropolitan areas of Sydney and Newcastle. In such cases the onus of having cows tested is thrown on the dairyman, who engages a veterinary surgeon from a panel of approved veterinary surgeons to undertake the testing. In other cases the testing is undertaken by either government or municipal veterinary surgeons. Compensation for animals destroyed may be paid by the controlling authority. This scheme has been undertaken for Canberra (government control) and Launceston (municipal control).

Advantages of the scheme are that the cost is borne wholly or in part by the dairyman, and that by this extension of the tuberculosis-free herd plan on a compulsory basis a tuberculosis-free milk supply can be attained. (A similar scheme, voluntary in its early stages, but compulsory when a certain percentage of suppliers has come in, has been adopted in Denmark by the owners of cooperative butter and cheese factories there.)

The tuberculosis-free milk supply scheme is particularly valuable where the whole of the cattle in a single area are employed for milk production. If, however, the area is only in part used for dairying and in part for cattle grazing and fattening, then it will follow that only some of the herds in an area will be tuberculosis-free. There will be a consequent danger of the disease-free herds' becoming infected, unless rigorous isolation is practised. There has thus come to be developed what is known as the "tuberculosis-free area plan", the attainment of which ensures for that locality not only the provision of a tuberculosis-free milk supply for human consumption and the freedom from risk to pigs from feeding on milk products, but free interchange of cattle from property to property. Thus no restriction on ordinary trading of stock within the area is necessary. If the area is large enough

this may suffice; but usually it is necessary to import stock, even if only for stud purposes. The sources from which such animals may be imported are necessarily restricted to another tuberculosis-free area or at least to another tuberculosis-free herd. The logical development of the "tuberculosis-free area plan" is, therefore, the extension to encompass as large an area as possible: a country, a province, a state—even a country.

Certain other countries have thus extended their tuberculosis control; and now even that vast country the United States of America, with a cattle population eleven times that of Queensland, is well on the way towards the eradication of bovine tuberculosis. For them it is a national scheme, undertaken by the Federal Government with the cooperation of the States. From modest beginnings twenty years ago the campaign has gradually been intensified, the annual appropriation last year being over eight million dollars. The result was that at the end of the year sixty million cattle were under the scheme (that is, 88% of all cattle), and in 44 States the incidence of bovine tuberculosis is now less than 0.5%.

Canada, too, is well on the way with its tuberculosis control schemes. Over 30% of their cattle come within the ambit of the schemes, and in large areas the incidence is now only a fraction of 1%. Certain Continental countries (Denmark, Finland, Germany *et cetera*), although faced with a much higher incidence of the disease than we in Australia, have embarked on comprehensive eradication schemes. It is safe to say that the position will be that, within a century, no country in which the dairy and pig industries are an important source of the nation's wealth will be able to afford the economic loss brought about by bovine tuberculosis. It is, I hope, apparent, therefore, that the chief reason for control and eradication of bovine tuberculosis is not its danger to human health, but the losses it occasions the stock industry.

Contagious Abortion of Cattle.

In contagious abortion of cattle due to the bacillus of Bang, or brucellosis as it is nowadays called, we have another cattle disease capable of attacking man, producing the affection known as undulant fever. Like tuberculosis, it is a source of great economic loss, leading to abortion of pregnant cows (though not all infected animals abort), and predisposing to genital infections that inhibit fecundation and may lead ultimately to sterility. The disease also attacks males, producing orchitis and epididymitis and leading to sterility. Calves are apt to be born prematurely and to be weakly animals.

The infection is commonly localized in the mammary gland of the cow, and may persist there for years, not even causing any gross changes in the mammary tissues. Small wonder, then, that the incidence in dairy cows is high, probably of the order of 10% to 20%, and that all pooled market supplies of milk are apt to contain the germ.

In the human subject the highest incidence of this disease is in veterinary surgeons, who, if they engage in obstetrical work, are exposed to infection through the skin of the arms—and rarely fail to contract it. The drinking of infected raw milk is evidently much less dangerous, though it is now recognized that a number of human infections occur this way.

In Australia, I understand, only a few cases have been found. Four cases at Canberra provided an impetus towards the eradication of the disease from the dairy herds supplying that city, and from an initial infection of 18% of dairy cows the incidence has, after less than a year, been reduced to less than 1%. The majority of the herds are quite free. This was achieved at a cost of under £1,000 for compensation for infected animals compulsorily destroyed.

As with tuberculosis, eradication is based on a test that will detect the apparently healthy carrier. The test in this case is an agglutination test performed with blood serum.

The difficulties in any eradication plan are not only the cost of testing and the loss from destruction of reactors, but also the provision of animals for replacement.

In any large cattle population, eradication must, therefore, be gradual. It must rest on the same basis as tuberculosis eradication, namely, the building up of abortion-free herds till an area plan is possible, and from that to complete eradication over larger tracts of country. This is in fact being practised in several countries; and here, again, the United States of America is leading the way.

All the Australian States have abortion-free herd schemes; but in general only comparatively few owners have availed themselves of this help, except in Tasmania, where the scheme is fast advancing and receives considerable inducement, because practically all show societies will take entries only from abortion-free herds.

Streptococcal Infections.

Tuberculosis and brucellosis are the two main diseases to which human beings are exposed to infection through milk. Septic sore throat has at times been traced to the milk supply; but the haemolytic streptococcus responsible for it is a very uncommon cause of mastitis, and such cases as occur originate from a human carrier, usually in the dairy. Infectious mastitis in the cow is usually due to a specific streptococcus non-pathogenic to the human subject.

The Provision of a Bacteria-Free Milk Supply.

Two lines of approach are available for the provision of a bacteria-free milk supply: pasteurization and disease control and improved sanitation. I do not deny the value of pasteurization; but in addition to the fact that it is at times regarded as a means of making impure milk wholesome, it should not be forgotten that it does not help towards eradication of disease from dairy herds. Nothing less than this should be the aim in the assurance of a pure milk supply.

Other Diseases to Which Measures of Eradication are Being Applied.

Three other diseases are the subject of eradication plans in Australia, and, though they are not communicable to man, they may be mentioned. They are the following.

Pullorum Disease of Poultry.

In pullorum disease of poultry the infection is spread by carrier hens through the egg to the young chick. It can be combated by similar measures, since there is an efficient diagnostic blood test, and disease-free flock plans are in operation in many countries.

Tick Fever.

Tick fever in cattle, as the name implies, is conveyed by ticks, but by only one particular species in Australia. If you control the tick, you control tick fever; and, as ticks can be destroyed by the dipping of animals in baths of arsenical solution, the spread of tick fever can be prevented by the setting up of a quarantine line and the dipping of all stock leaving the area. Additionally, dipping at fortnightly intervals for a year is used for eradication of the cattle tick. At the present time an extensive campaign is being waged to free the Northern Rivers District of New South Wales, the only part of that State in which the cattle tick occurs. This work is being aided by the Commonwealth and Queensland Governments, and when New South Wales is freed the campaign will be extended to the south-eastern part of Queensland. In this disease again the United States of America has shown us what can be done; for although nearly the whole of the southern half of that great country was at one time infested, thirty years of campaigning have resulted in eradication of the ticks from 95% of that area, and total eradication is in sight.

Bovine Pleuro-Pneumonia.

Contagious bovine pleuro-pneumonia has been eradicated from Victoria, and in New South Wales is now endemic in only a small part of the State. This has been accomplished despite the fact that the disease is spread by apparently healthy carriers amongst cattle entering the southern States from Queensland. It has been accomplished by the use to the full of common measures of preventive medicine: notification, diagnostic tests, destruction of infected animals, quarantine, vaccination and surveillance.

The Use of Vaccines.

Not all stock diseases are capable of eradication, and other methods have to be employed to combat them. Vaccination naturally comes first to mind. Here I may say that the only vaccines that are found to afford complete protection are the following: (a) those containing living organisms, either fully virulent or attenuated; (b) those containing modified toxins, that is, toxoids.

Dead bacterial vaccines are used in some cases; but it is admitted that the best they do is to enhance resistance, the animal still being susceptible, but suffering only a milder form of the disease. There is always some risk from the use of a living vaccine. Hence its employment in human medicine is restricted. We have there an advantage over you; otherwise your systems of vaccination and ours differ little.

Excellent results have been obtained in a number of animal diseases. The following are examples.

Anthrax.—Anthrax exists as a soil infection in certain States, though not in Queensland, and stock contract it by eating soil-contaminated pasture. (Sheep also contract it by puncture of the skin with soil-contaminated grass seeds.) Thanks to vaccination with an Australian-developed vaccine, which superseded Pasteur's classical product, losses are now negligible.

Enterotoxaemia.—Enterotoxaemia is a disease of sheep due to absorption of a toxin of intestinal origin. Curiously enough, the cause in this case is one of the gas-gangrene organisms, a type of *Bacillus welchii*. Though a common soil organism, and as such often ingested (in fact, it is a normal inhabitant of the large bowel), it produces toxin in the stomach only in certain circumstances. This is likely to occur, however, in lambs receiving large amounts of milk, and in grown animals on luscious feed. At times losses have been very considerable. Now, however, thanks to vaccination, losses have been much reduced. Young lambs, I may say, are protected by vaccination of their dams during pregnancy.

Contagious Bovine Pleuro-Pneumonia.—Vaccination against contagious bovine pleuro-pneumonia is carried out by the utilization of a culture of the causative agent, fully virulent, but inoculated into an area where there is little areolar tissue, such as the tip of the tail. Here it produces an inflammatory swelling, the reaction swiftly leading to the development of an immune state.

Two other systems of protective inoculation might be mentioned. First there is immunization by means of toxoid—a procedure allied to your diphtheria immunization—now being used successfully for botulism in sheep in Western Australia and for tetanus in areas where it is a frequent cause of infection of wounds. Secondly, there is what has been termed *prémunisation* by the French. This latter is applicable in the case of certain blood parasites, in which the persistence of the infection protects the animal against subsequent attacks of the disease. It is used extensively in Queensland for protecting cattle against tick fever, of which there are three forms. The procedure is to inoculate animals with blood from a specially prepared carrier, controlling the severity of the reaction if need be by the use of the drug acaprin.

Many other instances of the successful employment of vaccines could be cited.

Parasitic Diseases.

Even certain parasitic diseases are controllable, mass treatment being employed. By such means liver fluke has been brought well within control in New South Wales, Victoria and Tasmania; it does not occur in Queensland. Our main weapon here is dosing with carbon tetrachloride, one cubic centimetre of which is effective in killing all the flukes, even though they are in the liver. The embryo fluke may, however, persist for over a year in the vicinity of water; and as repeated infestation of sheep and cattle is apt to occur, and it is not practicable to dose them at frequent intervals, we attack the snail that acts as the host of the embryo fluke. This is done by draining swampy areas and by poisoning snails. Copper sulphate is added to the water in a proportion lethal to the snail but harmless to animals. By a combination of these methods it is possible to eradicate liver fluke; and this has in fact been done on properties in Australia.

Unfortunately our remedies for other parasites, notably stomach and intestinal worms, do not possess the same degree of efficacy, and we can therefore only control and not eradicate them as yet.

Hydatid disease is an example of a parasitic disease common to man and the lower animals, the host of the tapeworm being the dog, which becomes infected through eating uncooked offal containing hydatid cysts. City meat supplies are subject to inspection, so that dangerous offal is not there available as dog's meat. In the country, however, and particularly on stations where home killing is done, dogs commonly contract infection. Systematic medication of dogs, with cooking of offal, would control this parasite; but unfortunately the public here are not ready for such a campaign, though in New Zealand it has been commenced.

Food Deficiency and Poisonous Food.

We come now to a third group of diseases—those brought about by food deficiencies or the presence of deleterious substances in the diet. The vitamin requirements of different animal species vary greatly, and some species are able to synthesize certain vitamins. Under Australian grazing conditions stock usually obtain adequate vitamins from their diet; but where the feeding and housing become highly specialized, a deficiency in certain vitamins may occur unless it is carefully guarded against. Thus symptoms of lack of vitamin A may be seen in poultry that do not get adequate green-stuff, as often happens during continued dry weather. Rickets is apt to develop in chickens kept in battery brooders, where they do not have access to sunlight. Preventive medicine along classical lines obviates these losses.

Many of our soils are deficient in phosphorus. In other cases the available phosphorus is being reduced by grazing, so that our phosphorus-deficient areas are tending to increase. As a result, stock depastured on such areas suffer from lack of growth, have brittle bones and develop a depraved appetite,

chewing bones, sticks, stones and even dead animal material, such as rabbit carcasses. A further trouble occurs from the fact that such animal material (bones or other animal debris) is liable to have been infected with the soil saprophyte *Clostridium botulinum*. This organism produces the most powerful bacterial toxin known. This toxin may be abstracted by the animal's chewing such material, and the animal thus contracts the fatal disease botulism. Fortunately both the obvious effects of phosphorus deficiency and its untoward sequel, botulism, can be prevented if phosphatic licks are made available to animals. This practice of preventive medicine has been used with considerable benefit.

In certain parts of Australia and in New Zealand, stock grazing in certain areas suffer from grave anaemia, which causes a high mortality. After good results were obtained by the supplying of licks containing crude iron salts or natural ferruginous material, such as limonite, it was supposed that this anaemia was due to a deficiency of iron in the diet. More recently, however, it was found that pure iron preparations were of no avail and that iron-free extracts of limonite would prevent the trouble. Thus was exposed the fact that the real deficiency was in cobalt—an element needed by stock in very small amounts indeed, but necessary for the assimilation of iron. Losses from this deficiency are preventible, and profitable sheep and cattle raising is now possible in these districts, thanks to dietary supplement or actual medication with the lacking element.

Poisonous Plants.

Poisonous plants bring about serious losses, particularly amongst travelling stock, for local stock usually avoid them. Preventive measures here cannot be specific; but much loss is avoided by the detection and making known of these harmful plants, so that drovers may avoid them. Our most serious losses are probably from plants that contain cyanogenetic glucosides, the hydrocyanic acid being liberated on ingestion of the plant. So common in South Africa are these plants that systematic medication with sulphur is practised as a preventive.

The Effect of Shortage of Suitable Food.

Our greatest dietary affliction, however, is the general lack of foodstuffs that occurs in dry times—in the summer in the south and in the winter in Queensland. Stock grow and make weight during periods of plant growth; but after such plants attain maturity their food value gradually declines till the next growing season. There is thus an annual lean time for stock allowed only natural grazing. Not only do stock lose weight during such periods of scarcity, but, owing to the lowered nutritional state, they become more susceptible to certain diseases, particularly infestation by gastro-intestinal parasites. Here is an opportunity for preventive medicine; and it is now recognized that equally

important as medication; if not more so, is the provision of an improved food supply. Thus pasture improvement, supplementary feeding and the growing of fodder crops are valuable measures of preventive medicine.

Conclusion.

Many of our animals are undoubtedly "C3" from one cause or another. It may be that they are undersized; they may be poor producers; they may be diseased in the accepted sense. There is, however, the general tendency by various methods to reduce the proportion of "C3" individuals. Amongst these measures may be mentioned the licensing of stallions to ensure that only those of suitable type and free from hereditary defects are used for breeding; the testing of dairy cows for butter-fat production; progeny tests of pigs (to ensure adequate litters amongst other things); and, of great importance, the extensive culling that is practised in the sheep industry. It is no uncommon thing for a breeding flock to be culled to the extent of 30% for deficiency in wool type or in that vague but real attribute, constitution.

The future trend in animal production is perhaps best shown in the national poultry improvement plan adopted in the United States of America. This provides that flocks shall progressively qualify for stages of excellence as regards purity of type and ability in egg production. The disease side is being controlled by gradual eradication of pullorum disease, whilst other diseases are being combated by strict sanitary measures. This plan is voluntary at the present time; but it is hoped it will be adopted in all parts of the United States of America.

But we have not yet considered all the methods of preventive medicine. The most important (and very necessary before we can adopt any of those which I have mentioned) is education—and here I mean the education of the stock-owner; for it is possible to practise preventive medicine only in a community sufficiently enlightened to give you the authority and the wherewithal to apply it.

Finally, I would say that whatever animal species is concerned, preventive medicine aims at the production of a healthy infant, that it may have no congenital disability; the nurturing of the growing animal, that it may attain full and perfect development; and the maintenance of the adult, that it may fulfil, in the highest degree, the purposes for which it was created or is being utilized under our civilization.

Acknowledgement.

I desire to thank Dr. W. A. N. Robertson, Director of Veterinary Hygiene, Commonwealth Health Department, Canberra, for so kindly allowing the use of the figures regarding the incidence of tuberculosis in cattle.

THE TREATMENT OF MENTAL DISEASE BY
ELECTROTHERAPY.¹

By E. A. ELLIOTT, M.B., Ch.M. (Sydney),
Hobart.

I HAVE been interested in electrical therapy for twelve years, but have collected the records of cases for only three and a half years. At that time I obtained an inductotherm. Observations cover nearly 500 patients, treated during a period of over 5,000 hours. The time of treatment is twenty minutes, or a little longer, three or four times a week. Some patients need only a few treatments, whilst the patient whose illness I wish chiefly to discuss this evening has come for treatment 130 times during a period of eight months.

The first thing noticed during treatment is the soothing effect; this is so pronounced that it is not uncommon for patients to fall asleep. This factor is valuable in treating patients with mental distress, because sleeplessness is usually an important symptom.

The series includes 25 patients, 23 of whom suffered from mental states of a psychoneurotic or psychiatric nature. Schizophrenia, neurasthenia and hypochondria are included. All patients recovered.

Case Histories.

G.McK., a woman, aged thirty-three years, married, suffered from delusions and hallucinations. She was often depressed and took no food. Her illness was of five years' duration. Three weeks' treatment led to her recovery. After three years she is still happy in her home life and social activities.

H.B., a male, aged twenty-one years, a motor-car driver, had been involved in an accident four months previously. Since then he had been sleepless and depressed, and had suffered from loss of vitality. Three weeks' treatment led to his recovery. He has been working cheerfully for two and a half years.

L.B., a single woman, aged 35 years, was an office worker. Her tongue was coated, she was breathless on exertion and her pulse rate was rapid. She was furtive and sullen in manner and ceaselessly talked of suicide. After five weeks' treatment she became quiet, restful and contented. She has remained well for two and a half years.

M.A., a female, aged twenty-eight years, living with her parents, suffered from hysteria, noises in the head and hallucinations. At times she was violent and attacked her parents. She recovered after three weeks' treatment, and has remained well for two and a half years.

G.S., a female, aged twenty-two years, was employed in an office. She was debilitated, and trembled and shivered. She was unable to sleep alone or to be left alone. Her illness was of one year's duration. After five weeks' treatment she was able to resume her occupation. She has enjoyed good health ever since, a period of two years.

C.D.D., a male, aged forty years, a painter, had been gassed on active service. His illness was of four months' duration. He had hallucinations and was disrespectful to his mother. He had separated from his wife, would not work, suffered from sleeplessness and had a poor appetite. After four weeks' treatment he became cheerful and

active. He returned to work. Six months after treatment he was still well.

One patient had been suffering from the pathological sleep known as narcolepsy, and is still under treatment. She is a school-teacher, aged twenty-three years. Her illness is of eight months' duration. Treatment was begun on April 25, 1938. She is now nearly well, and has undertaken her onerous duties of teaching over sixty young children, and studying.

The final case for discussion in detail is the following.

The patient, R.E.E., was aged forty-four years. He was married, and had four children. There was nothing of importance in his family history. He was powerfully built, and had been nicknamed "Hercules" by his comrades on active service. In Egypt he had an attack of fever of undiagnosed origin, and left for France at his own request before he was convalescent. I have seen him from time to time for nine years. He has been quiet and undemonstrative at all times. His present illness began over two years ago, when he fell from his bicycle and could not account for his mishap. He had noticed that his movements were slower than formerly, and that periods of sleepiness at work and elsewhere overcame him. He had also noticed that his muscles were becoming stiff. Believing that his illness was due to war service, he decided to seek treatment from the Repatriation Department medical services, and I more or less lost sight of him for twelve months or so. I am indebted to our chairman, Dr. R. Whishaw, for the following notes on his condition made about eighteen months ago.

Good colour and nutrition; muscular development above average. Depressed, nervous manner. Definite lack of expression in face; movements all slow and deliberate. Cerebration slow and not clear, with poor memory and suppressed emotion. Sweating, but face not greasy. Speech slow and monotonous. . . . Gait rather slow, turning round is not done very evenly; arms swing, but stiffly; head slightly bent (not trunk). Definite hypertonicity of muscles, which chiefly affects extensors of spine and the arms. . . . Coordination good, but movements of arms accompanied by tremor. Fine tremor is present in both hands.

Dr. W. T. Freeman also kindly supplied corroborative evidence. Both medical attendants agreed in a diagnosis of post-encephalitic *paralysis agitans*. No response was elicited to the Wassermann and Kline tests.

On January 11, 1938, almost against his will, I induced him to try electrotherapy. His body then was rigid. To look sideways or behind him he would slowly shuffle round on his feet. His mind and memory were clouded. He was very despondent. His systolic blood pressure was 160 and his diastolic 120 millimetres of mercury. These figures have remained more or less constant. At night-time he was sleepless, but during the day was apt to fall asleep in the garden or wherever he might be. After two weeks' treatment he began to sleep better at night, and in another two weeks his mental attitude was decidedly brighter and he said that he felt his muscles relaxing. After three months' treatment he was well enough to be looking forward to work. Then followed a slight set-back, lasting about three weeks. Again recovering, about six months after treatment began, he was bright and cheerful and able to touch his ankles. He interviewed the Public Service Commissioner, and was promised the first vacancy in his old employment, at the Government Printing Office. It has not yet been given; but I believe that congenial employment, with the knowledge and satisfaction that he was providing for his wife and children, would be helpful in this patient's recovery. I do not think that the number of treatments given have been altogether necessary, but I have been anxious to keep in close touch with him, giving him moral support and encouragement as well. He says he was told that he was incurable, and some of his associates encouraged him in being content with a pension. The situation is complex. Although he still shows signs of a certain amount of rigidity, yet on the whole this

¹ Read at a meeting of the Tasmanian Branch of the British Medical Association on September 13, 1938.

patient now is much the same as he was eight or nine years ago. From his state 12 months ago he is vastly better, and I am hopeful that the future will show that this improvement is permanent.¹

Discussion.

I should like here to refer to an article by Halliday in *The British Medical Journal* of July 2, 1938, at page 11. In an article entitled "An Analysis of Morbid Statistics" he makes the following statement:

... the increase in incapacitating sickness, its maintenance at a high level, and the growth of chronic invalidism among insured persons have puzzled many commentators. Recent enquiries by the Regional Medical Staff of the Department of Health for Scotland have shown that the mass of chronic incapacity in that country may be regarded as genuine.

He shows that the only possible interpretation of the maintenance of the present high sickness rates is an increase in psychoneurotic and psychosomatic illness. I believe that practitioners in Hobart can find enough cases locally of this nature without going to Scotland, and I also believe that congenital employment would bring down the number considerably.

Medical Treatment.

Medical treatment has been given chiefly to make up the iodine deficiency so pronounced in Tasmania. My favourite prescription for the patient last discussed is 1.9 cubic centimetres (half a drachm) of tincture of iodine in glycerine, three times a day, in milk. At other times iodine is given by inhalation from a small sponge saturated and placed in his bedroom. He feels a need for this drug, and is better when taking it. Recently "Genoscopolamine" (Joubert) has been added with benefit.

Electrical Treatment.

Electrical therapy has been tried by many authorities. Cumberbatch⁽¹⁾ states that the severest test for a new method of treatment is applied when the treatment is tried for diseases for which no known methods are successful. He then describes five cases of *paralysis agitans* in which diathermy has been helpful. All the patients were above fifty-four years of age. He mentions three others who were younger, but derived no benefit, and assumes that patients under the age of fifty years are not benefited by electrotherapy. He advises general treatment rather than applications to the head.

Schliephake,⁽²⁾ who is regarded as the pioneer of short-wave therapy, obtained improvement in treating diseases of the central nervous system, but he applied treatment to the head.

Weissenberg⁽³⁾ cites workers whose experience shows that short waves have a specific influence on nervous tissue; he stresses the fact that weak currents are often more beneficial than strong currents. He also reports favourably on patients with *paralysis agitans* so treated, although he found little diminution of the tremor. He obtained a cure in only two out of eight cases of mental disease, melancholia and depression. Two patients with

schizophrenia went into a state of excitement without any other change. Treatment was given to the head.

Messrs. Watson Victor, Limited, of Melbourne, have compiled a list of 35 diseases distributed among 20,000 cases. In over 90% improvement occurred as the result of treatment by the inductotherm; my own figures agree with these. In their list 1,740 patients with neuritis were treated, of whom only 5% did not obtain relief. No cases of mental diseases are mentioned.

I have applied local treatment to the head on only a few occasions in the case of mentally abnormal patients, as it seems to upset them. I prefer general treatment. This is given in the following ways. One coil of the fourteen-feet electrode is placed on the couch on which the patient lies, and another coil, termed a "pancake", is placed on the abdomen. Intestinal toxæmia has for a long time been associated with mental disorder. It is known that bacteria can decarboxylate proteins, the process giving rise to powerful pharmacological substances. It is for this reason that I treat patients suffering from various sicknesses with general treatment, attacking a presupposed infection responsible for the condition; I may follow on with local treatment.

Much enlightenment has followed this procedure.

Two female patients came to me for treatment for arthritis. One was aged fifty-five years, the other seventy-five years. Both also suffered from diabetes, and both recovered; at any rate, there was no response to Fehling's test after six months.

In view of the recent treatment of schizophrenia by insulin shock therapy, these cases surely are of significance as regards the usefulness of electrical therapy.

My experience of over twelve years in the treatment of pneumonia by long-wave diathermy has demonstrated that the high-frequency current possesses the power of liberating oxygen; the cyanosis of the lips and cheeks soon changes to the brightness of well-oxygenated blood. I have treated no patient with pneumonia by the inductotherm, as my machine is not a portable one. I have, however, treated several patients with erythrocyanosis, and have observed a change to a bright colour take place in the blood stream at the affected areas; so that the short wave has an effect similar to the long-wave current. Electro-pyrexia is becoming the recognized treatment for general paralysis of the insane; but this is probably largely due to the specific action of heat on the cause of this disease. It is not heat alone that cures in many diseases of the nervous system, because the secret of success often lies in mild dosage. Neither does the secret rest in wave length. Both factors enter into the picture. Heat certainly makes the blood more fluid, and it acts as a vasodilator as well, whilst wave length doubtless influences penetration; but why so many writers argue around these two points is a matter that I cannot understand. The outstanding factor in electrotherapy, in my opinion, is its influence on gaseous interchange, visible at every treatment. It

¹ In January, 1939, the improvement is maintained.

has also been ably demonstrated by physicists and recorded in text-books that the alveolar oxygen tension is increased. This process in turn raises the oxygen tension of arterial blood; at the same time the carbon dioxide tension is reduced, and the alkalinity or pH is increased. This acts as a tonic directly on the patient. It may also counteract a breakdown of metabolism induced through gross overloading of a mute digestive system with substances for which it was never intended, as well as through too rapid loading. Such a breakdown would lead to auto-intoxication, and enable bacteria to gain the upper hand; this results in the formation of still more potent toxins, as previously stated. I believe this process to be the cause of much general as well as mental illness, a belief held in contradistinction to the Freudian doctrine of sexual perversion as causative of so many ills.

I state, therefore, that electrical treatment of mental disease is a logical procedure.

The Pathology of Mental Disease.

The pathology of mental illness has been the despair of writers. Thus, in 1933, Sherrington made the following statement:

We have to regard the relation of mind to brain as still not merely unsolved, but still devoid of a basis for its beginning.

However, enlightenment has been given by Pickworth in an article entitled "New Outlook on the Physiology and Pathology of Mental and Emotional States", published in *The British Medical Journal* of February 5, 1938. He states that the "toxin-impaired neurone" theory is untenable; and in psychiatry none of the present-day theories of disordered mental states attempt to account satisfactorily for the clinical remissions and resuscitations that are universally recognized. Mental hospitals would be difficult to manage if the majority of patients were not comparatively lucid for most of the time. He mentions that Loevenhart, in 1929, discovered that if mute and apathetic patients with mental disorder were asphyxiated almost to the point of death, there followed a period during recovery when they became perfectly rational and apparently mentally normal. Even states such as Parkinsonism may be temporarily relieved. Pickworth points out that many speculations have in the past been advanced about the identity of mental and emotional states with a synaptic function. Other attempts have been made to correlate mental disorder with a pathological condition of the cerebral vascular system. In this study the workers have found as a stumbling block the extreme vulnerability of the ganglion cells to oxygen lack, there being a relatively enormous demand for oxygen by the cells and at the synapses. Reflexes can be facilitated by an increase in blood supply to the synapses, and other responses can be inhibited by relative ischemia of the respective synapses. This control is part of the capillary mosaic, and therefore part of the mental and emotional state existing at the time. In the opinion of

Pickworth these states can be identified with the cortical capillary pattern, which provides an efficient mechanism for the actual control of the pattern of synaptic junctions of the 12,000 millions of neurones of the central nervous system. Any degenerative changes in the brain parenchyma have only a secondary relation to the actual phenomena of mental disorder. Lesions produced by the destruction of nerve tissue are permanent dementia, or neurological rather than psychiatric disorders. Otherwise there is difficulty in explaining the lapse into the identical disordered mental state that rapidly follows the lucid interval produced by artificial cerebral stimulation. But the action of toxin upon the vascular supply of the brain is supported by many concordant observations. Mental disorder can be identified with a mixing up of normal and abnormal capillary mosaic patterns.

Even if it is post-encephalitic in form, the pathology of *paralysis agitans* reveals a more serious brain lesion than one simply of vascular control. *Paralysis agitans* is a disease of the basal ganglia, the essential lesion being primary atrophy of the efferent neurones of the *corpus striatum*, with changes in the nerve cells. In its occurrence, symptoms, course and results, it is one of the most sharply defined disease entities; according to Christiansen ("Nelson's Loose-Leaf Medicine", Volume VI), it is never cured and always follows a progressive course. In chronic encephalitis signs of a former inflammation are found: the brain and meninges are hyperemic; perhaps no macroscopic change is evident. Microscopic changes include a perivascular infiltration, mainly of lymphocytes, and some large mononuclear cells. In the brain substance old inflammatory foci, which have been converted into scar tissue, are seen, and usually fresh inflammatory foci denoting progressive change are found. Among the apparent predisposing or exciting causes of *paralysis agitans* may be mentioned depressing emotions, physical exhaustion and injuries. The last patient discussed has been subject to all these. The aetiology of acute epidemic encephalitis is infection by a virus. There is also a history of the occurrence of this infection in his case. Although the symptoms of encephalitis usually include those of ocular paresis, which have not appeared in this case, yet I think that the diagnosis is that of post-encephalitic Parkinsonism.

Conclusion.

I trust that those of you who saw the patient twelve months ago will agree that the future is more hopeful in cases of brain disease if electrical treatment is used, and that the earlier the treatment is undertaken, the better the patient's prospect of recovery.

References.

- ¹ E. F. Cumberbatch: "Diathermy, Including Diathermotherapy and Other Forms of Medical and Surgical Electro-therapeutic Treatment", third edition, 1937.
- ² Schliephake: "Short-Wave Therapy" (English translation).
- ³ Holzer and Weissenberg: "Foundations of Short-Wave Therapy" (English translation).

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ILLUSTRATIONS TO THE ARTICLE BY DR. H. H. SCHLINK.

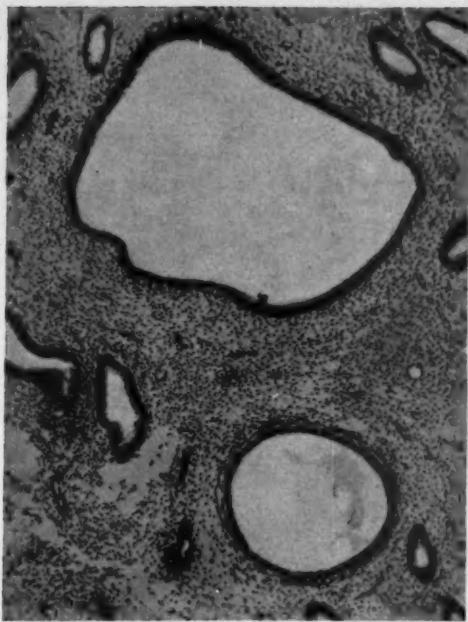


FIGURE II.

Appearance of Swiss-cheese or glandular hyperplasia of the endometrium as seen with the low power of the microscope. (Serial number 189.)

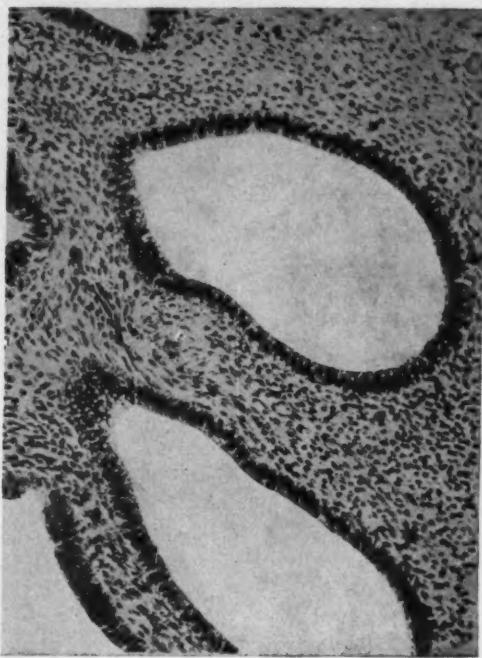


FIGURE III.

Appearance of Swiss-cheese or glandular hyperplasia, showing pseudo-stratification of the lining epithelium of endometrial cysts, as seen with the high power of the microscope. (Serial number 187.)

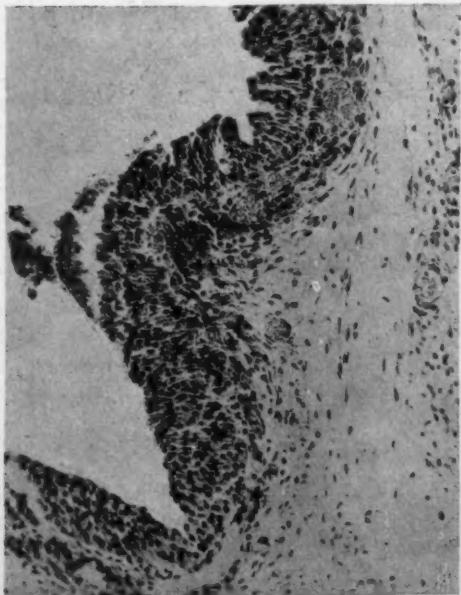


FIGURE IV.

Wall of persistent ripening follicle, which shows faint signs of luteinization in outer theca interna layer. (Serial number 188.)



FIGURE V.

Appearance of wall of persistent follicle, showing internal granulosa layer and external theca interna layer, as seen with the high power of the microscope. (Serial number 190.)

ILLUSTRATIONS TO THE ARTICLE BY DR. REGINALD WEBSTER.



FIGURE XXVII.

Neuroblastoma arising in the medulla of the right adrenal: massive involvement of the liver.

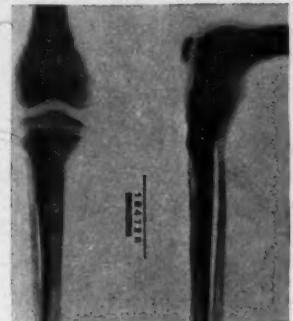


FIGURE XXVIII.

Metastases of neuroblastoma: destructive lesions in the proximal portion of the tibia.



FIGURE XXIX.

Radiogram of the skull: diffuse mottling occasioned by multiple metastases of neuroblastoma in the cranial bones.

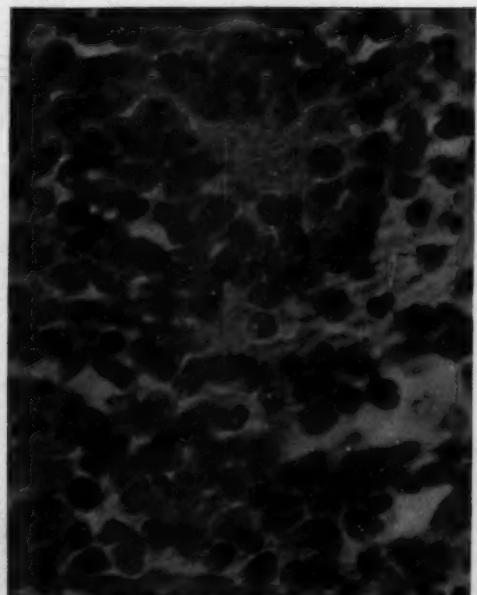


FIGURE XXX.

Photomicrograph of a section of the tumour shown in Figure XXVII. For many years it was regarded as retroperitoneal lymphosarcoma. There is one characteristic "rosette" in the field.



PHYSICAL THERAPY IN DISEASE AND DEFORMITY OF CHILDHOOD.¹

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THE discussion tonight being of the nature of a symposium, I am briefly dealing with the subject as it comes within my own experience.

The use of physical agents in the treatment of sickness and diseases dates far back. Like all forms of medical treatment, little is heard of its use or progress in the Middle Ages; but within the last century it has made rapid strides. Peter Ling, in Sweden, placed gymnastic exercises on a scientific basis. He divided them into (a) those for the development of the body and (b) those used for the remedy of defects, or remedial exercises.

These two groups of exercises have developed along separate lines. The former we know as physical training; and it has come to include all games, dancing, swimming *et cetera*. The second group we know as medical gymnastics; and the teaching of these exercises now forms an important part of what we call physical therapy.

In 1872 a Danish clergyman, Hans Knudsen, started a movement in his country for the proper treatment of crippled children. Since then great progress has been made all over the world in the treatment of cripples. Physical therapy plays a most important part in such treatment, and it has made progress along with the improvement in this work, so that we may say that it is impossible to carry out treatment of crippled children without a proper knowledge of physical therapy.

Physical therapy covers a very wide field. It is not only the use of physical agents, as its name would suggest; this is its least important use.

When dealing with children especially the most important point of all is to teach or train a child in the proper use of a part that has been damaged by disease or injury. This we call reeducation, and it usually applies to muscular action; but in reeducation there is also the careful handling of the part by the reeducationist.

The essential factor in physical therapy is the competent physical therapist, who must have had a wide training in the basic subjects, such as anatomy, physiology and pathology. As well as this he or she must understand people and be able to gain the confidence of the person undergoing treatment. Especially does this apply to children.

The physical therapist takes his or her instructions from the medical attendant, a strict rule being that no patient is treated except under medical instructions. We should therefore know something of what we are ordering.

Massage Manipulations.

Many forms of manipulation can be given in massage. These are for the purpose of altering the local condition. The desired effects are on the nervous, muscular and vascular systems.

Movements.

Movements may be active or passive. Active movements may be free, restricted or assisted. When the movement is forced, it is often spoken of as manipulation by the surgeon. This movement may be forcibly carried out by the surgeon or by the masseur without anaesthesia and while the patient is relaxed. Gradual movements may be carried out by the masseur over a prolonged period. These manipulations are for the purpose of stretching the tissues or adhesions that have from any cause become contracted or shortened.

I shall discuss later how important is all this in the treatment of congenital deformities.

Body weight may supply the stretching weight in hanging *et cetera*, as in the treatment of scoliosis.

The Use of Physical Agents.

Many physical agents are at the disposal of the masseuse or physical therapist. Their use is only of minor importance.

Hydrotherapy.

Water is used as a medium for exercises, in which the force of gravity is eliminated and friction reduced to a minimum. If the specific gravity is changed by the addition of increasing quantities of saline, some alterative effect is supposed to occur.

Electrotherapy.

Electrotherapy includes all forms of treatment by electrical apparatus—faradism, galvanism, ionization and diathermy.

It appears to some of us that diathermy is a form of treatment that has been greatly exploited. It is an easy and convenient way of giving treatment by heat, and does not by any means justify the reputation given to it by those who construct the machines or by those who have not the proper knowledge of its use and limitations. It is not without its dangers, and is rarely called for in the treatment of children's diseases. Serious diathermy burns, which are slow to heal, may occur.

Actinotherapy.

Actinotherapy is the use of different forms of light. Here in Queensland, with the amount of sunshine we enjoy, there is little use for many of the radiation treatments that are extensively used abroad. Ultra-violet rays are rarely used; but in children with impairment or loss of muscular tone there is the necessity for some form of treatment that will improve the circulation before the movements are carried out. I have found the use of infra-red radiation of great benefit in cases of poliomyelitis. Radiant heat can be included here.

¹ Read at a meeting of the Queensland Branch of the British Medical Association on October 7, 1938.

The heat cabinet is coming more and more into use abroad for the treatment of certain diseases; but this does not come into the treatment of the child. It requires very elaborate equipment and skilled supervision.

X Ray Therapy.

X ray therapy is not included in this discussion.

The Field of Physical Therapy.

All forms of physical therapy are only adjuncts to medicine and surgery; often they are credited with being a certain cure for various disorders, from boils to backache.

It is indiscriminate ordering of this treatment in unsuitable cases that brings discredit on physical therapy. Again, it is often not ordered for patients who would derive great benefit from its use.

Tonight I shall have time only to deal briefly with the use of physical therapy for children, under three headings. This does not cover the whole field of its usefulness, as I must necessarily omit many disorders in which it is of great value, such as rheumatic fever *et cetera*.

Congenital Deformities.

Almost all congenital deformities, as far as orthopaedic treatment is concerned, are associated with unbalanced formation, or uneven growth and development, of the part affected.

Lesions of the spine, such as congenital scoliosis, are unsatisfactory to treat; but patients with such abnormalities respond somewhat to the application of a support and the use of physical therapy.

The main line of treatment is to give those exercises that will assist in correcting the deformity. Breathing exercises are very important. The parts can also be stretched by the use of some form of extension apparatus, the weight of the body being used as the stretching force. This method is much used abroad, especially in the United States of America.

For a certain time each day the child should be suspended by a halter. Many children and even adults cannot stand suspension in the erect position. It is better, especially at the commencement of treatment, to allow the patient to sit while the extension apparatus is applied.

We all know the value of continued treatment by the masseuse in cases of congenital torticollis.

Congenital Talipes.—We are concerned mostly with the usual type of club-foot, in which there has been a lack of growth on the inner side of the foot, and contraction of the tissues has resulted. By the use of manipulation and support growth may be influenced and contracted tissues stretched.

Two forms of manipulation are carried out, forcible manipulations and daily manipulation. Forcible manipulations are carried out at regular intervals by the surgeon, and are followed by the application of plaster. Daily manipulation can often be carried out by the parent, but is best done by the masseuse. It is followed with support by rigid adhesive strapping.

Paralysis.

Under the heading of paralysis I shall not discuss the treatment of those children suffering from spastic paralysis or local conditions of the muscles, but I shall deal with paralysis due to interference with the lower motor neurone.

The two types that most concern us are paralysis due to lead poisoning and paralysis due to acute anterior poliomyelitis.

Paralysis due to Lead Poisoning.—Paralysis due to lead poisoning is not uncommon; it is of the peripheral type, and is associated with wrist-drop and foot-drop. In early cases there is a good response to support and muscle reeducation, combined with some form of heat and massage; but patients who are far advanced improve very little.

Paralysis due to Acute Anterior Poliomyelitis.—Recently a great deal has been written on the subject of paralysis due to poliomyelitis; but the treatment has by no means been standardized. There are many variations in the phenomena associated with this disease, and there is still a great deal to be learnt about treatment.

I need hardly go into the basis of the treatment of these children. The disease, by causing paralysis of muscles, causes a loss of symmetry of the body; deformities develop. The worst type of deformities are those occurring in connexion with the trunk. Loss of lateral symmetry is the most important; scoliosis is caused by it.

Derangement of the antero-posterior symmetry causes interference with the normal curves of the spine and abnormal postures are produced.

The limbs are next in importance; but one must not lose sight of the fact that the body is a compact unit consisting of many parts, and that interference with one part influences the whole.

One of the fundamental principles in the treatment of muscle damaged either by trauma or by disease is that healing should take place with the muscle in the normal position; a permanently stretched and elongated muscle is of little value. For this reason rest and support to the affected muscles should be given from the onset of the disease. Absolute rest is indicated during the early acute stage. The muscle is then in an irritated condition, as evidenced by the acute pain.

It is often difficult to decide when movement should be begun; certainly not when movement causes pain and distress to the child. The movements in the early stage should be truly passive; they can be begun early if they can be performed without pain.

Do the early movements cause the persistent stiffness that is present in some cases? During such an epidemic as that we have recently had, a proportion of the patients suffer from this stiffness, which has nothing to do with the joints. It is due to the condition of the soft tissues, and is comparable with the condition found in any type of ischaemia. My opinion is that most of these patients will lose their stiffness if the nutrition of the part is improved.

I have recently studied some of these patients and I am certain that early treatment has no bearing on this early type of rigidity. Some of the cases in which stiffness has occurred have been of the encephalitic type.

Movements are assisted by being carried out under water. The circulation is improved if the water is warmed; but I am not in favour of a high saline concentration. Gymnastics under water are very important in the treatment at all stages of the disease; even in the very early stages the patient may be soothed and the pain eased by warm baths, which may be used as in the treatment of typhoid fever.

Active movements should be carefully given. The load must never be too great. A muscle that has been damaged will never attempt to perform work if it is not capable of doing so; it will just give up and become elongated. We see this often in the work of reeducation of the muscles. The response of a damaged muscle has no resemblance to that of a normal muscle.

If elongation occurs, the movement may stop or be taken on by another muscle; a trick movement may be initiated when the movement occurs in an irregular manner.

The patient is always aware of return of power of a muscle before the attendant can detect any movement. I have noticed that a muscle that is going to recover does not waste rapidly in the early stage of the disease, and never really loses its tone. This I have considered as an important point in the prognosis. Muscles that rapidly waste and become flabby, so that the bone can easily be felt beneath them, rarely recover.

Light massage and gentle handling of the part can be of assistance. It can have a soothing effect in the early stages. Some handling assists as a prelude to reeducation. Electrotherapy is not indicated.

Testing by faradism is not satisfactory. It is well known that a return of movement often occurs before response to faradic stimulation. Treatment by faradism may do harm by causing overwork. These children suffer from interference to the circulation, and some form of heating is valuable. I have used infra-red radiation with good effect.

When should these children assume the erect position? This is a question about which there is a great deal of discussion. Cases vary very much, and there is no set time. The physical therapist keeps a careful check on the posture assumed by the patient, and notes whether good posture can be maintained. Great care should be taken that weaknesses do not develop that were not present while the patient was in the recumbent position. My usual plan is to take the children through stages—first sitting, then standing for balance, and finally walking. The posture of all children after prolonged recumbency is in an unbalanced state.

From what has been said you will realize that treatment by the physical therapist of a child affected by acute anterior poliomyelitis is not a

simple procedure. It calls for a good anatomical knowledge of the muscles and their functions, also of the different normal and abnormal positions of the trunk and limbs. The physical therapist should be endowed with an unbounded supply of patience and the capacity of winning the confidence of the child.

Spastic Paralysis.—The treatment of spastic paralysis is altogether different from the treatment of paralysis due to a break in the lower motor nerve. There are increased spasm of the muscles and loss of coordination of movements. Associated mental changes are also present.

Any form of stimulating treatment is contraindicated. The child must be taught to coordinate movements. Many simple devices may be used, such as placing blocks together, placing rings on a peg, matching colours *et cetera*.

The different fundamental positions and movements, such as sitting, standing and walking, are taught. Walking between hand-rails or under water greatly assists the child.

At the Children's Hospital, Boston, there is an excellent clinic for children with spastic paralysis. Different simple movements are taught to the accompaniment of nursery rhymes. Each child is treated in a separate cubicle. These children suffer from lack of concentration; their attention wanders very easily. One must be very careful to avoid excitement; hence the isolation during treatment, and the necessity for taking the child through the exercises carefully and patiently.

A period of free play before coordinated movements are commenced is of great importance.

No child should be declared unsuitable for treatment on account of the degree of mental defect present. Also no child is too young to commence treatment. I have found that the earlier treatment is commenced, the better is the result.

As well as by reeducation, good can be done by the gradual stretching of the parts. This stretching must be essentially passive, since if increased spasm is set up, more harm than good is done. Splinting of the feet is valuable for these children to prevent increase of deformity; but it cannot be set down as a cure for the disease.

It is very difficult to maintain control against muscle pull in a condition of spasm of the muscles. Great care must be taken to prevent pressure sores while the limb is in the splints.

Conclusion.

I have given a rapid survey of the use of physical therapy in some of the disorders affecting children. I have by no means covered the whole field. In the treatment of children the work of the physical therapist is very exacting; it requires an abundant supply of patience and perseverance. As medical men we must be prepared to order and supervise such treatment. By proper team-work good results will be obtained in cases which might at first appear to be hopeless. Often the period of treatment is lengthy, so that it is essential that we should have

the proper understanding and cooperation of those responsible for the welfare of the child.

It is also desirable that those responsible for the health services of the community should provide the proper accommodation and facilities for such treatment, not only in the capital cities, but also in the country centres, so that here we shall not lag behind other communities that have tackled the problems of the sick child in the proper scientific manner.

PHYSIOTHERAPY AND POSTURE, WITH SOME
REMARKS ON POSTURAL ANATOMY.¹

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THIS is the age of keeping fit. And in his effort to keep fit Mr. Citizen has deserted the profession and gone to the quack. Advice in keeping fit seems to be the quack's prerogative.

The purpose of this paper, limited as to time, is to bring before you with emphasis some postural and gymnastic truths, and to suggest that the field of medical gymnastics could find a larger place in our training and in our practice. If we limit our advice to the tired business man or the weedy boy to urging him to take up "golf or tennis or something", we are, verily, no better than the retired Olympic champion who thinks himself well qualified to advise on all matters muscular.

In latter years much painstaking scientific research has been done to prove the basis on which rest the good results obtained from the activities associated with keeping fit. When one considers that the muscles of our body make up such a preponderant percentage of body weight, it is surprising that the study of muscle activity has been so much neglected till recent years. The necessity for muscle activity has ever been recognized, its rationale only now.

In muscle tissue there are more capillaries than muscle fibres. In a muscle no thicker than a pin there are more than six hundred capillaries and two hundred fibres. With full exercise these vessels are stuffed full of blood and the metabolic changes are enormously increased in the muscle. Quick emptying of the veins and lymphatics and acceleration of the blood stream in general occur. Brown and Roth have shown that during exercise the number of open capillaries in the skin per square millimetre is greatly increased. In the normal active individual the capillaries in the nail bed are packed in hairpin-like loops; in the arthritic still hand, they are straight and fewer in number, indicating diminished blood supply. This fact also indicates that the circulation is improved by exercise in other tissues than muscle in the normal active individual.

As is well known, active exercise calls into play the entire muscle mechanism. This statement cannot

be made in connexion with any other form of physiotherapy. In active exercises the following mechanisms are called into play: (i) the upper and lower motor neurones and the muscle cell; (ii) an inhibitory mechanism calling for skilful, precise movement; (iii) the process insuring relaxation of antagonistic muscle groups.

The complicated mechanism here portrayed is that on which posture depends. An even balancing of static and positive activity in front, back and side groups of muscles, moulded on a bony framework free from defects, makes for good posture; this we recognize when we see it, but it is difficult to define. Perhaps the best definition is that the person with good carriage bears "the stamp of controlled force"—well poised, ready for action, and with lines fit to be portrayed by an art class. The ideal stance should be effortless, and, in most cases, provided there are no organic defects and that the right dietary is used, it can always be produced in the young.

Although time does not allow me this evening to discuss properly all the baneful effects of poor posture on the organism, some enlargement upon them is instructive.

When the child in the second year of life assumes the erect posture the following series of important changes takes place: (i) changes in muscular development; (ii) changes in coordination of muscle activity; (iii) changes in the breathing mechanism; (iv) changes in the mechanics of circulation; (v) an increased tendency to displacement of the organs. With ordinary development and the adoption of a normal posture, the body meets all these difficulties satisfactorily. Any fault in the stance, however, will surely accentuate the difficulty and produce important organic defects. How well we know the bad effect of weak abdominal muscles in the corpulent, lazy man or woman, or in the underfed rachitic child! Loss of active pressure on the bowels and viscera and loss of axial balance occur and lordosis is produced. This results from a change in the location of the centre of gravity, due to the slipping downwards of the viscera in orthograde man. Weak abdominal muscles also mean poor flexion of the spine, and overaction of the extensors results. How well recognized is the congenital or acquired knock-knee, which soon produces pronated feet! It is better called by the Germans "sink foot", because the primary fault is a sinking of the longitudinal arch at its top. One often meets with the reverse condition of affairs—the initial sink foot, the secondary strain on the knee and the tertiary strain on the lower part of the back at the sacro-iliac or lumbo-sacral junction. Indeed the foot, of all places, shows best the results of poor posture. In what other place in the body could we see the following abominable concatenated series of events—flat-foot, bunion, march fracture of the second metatarsal? A beautiful piece of living architecture has been thrown into living ruins, perhaps through an early and small fault in posture and stance.

One of the commonest and ugliest malpostures is that of round shoulders; it is detested by women

¹ Read at a meeting of the Queensland Branch of the British Medical Association on October 7, 1938.

and heartbreaking to the surgeon when fully established, and it is easily recognized in its early stages. This is the most common of all postural faults. Considering our occupations, it is wondrous that it is not the rule with us as with the apes. School work, artist's work, library and laboratory work, all tend to nodding of the head, arching of the cervico-dorsal part of the spine and gliding forwards of the scapulae; in fact, to veritable drooping of the upper part of the skeleton—and so with sweeping, ironing and scrubbing. Reading is thought to be the most common single cause of this defect. To save the arm muscles the head comes down. An inventor of a universally adaptable book support would earn the gratitude of the race, because he would probably abolish much of the production of round shoulders in our community. Round shoulders have unpleasant sequelæ: flat chest, through falling of the ribs because the scalenes and sternomastoids are acting at a disadvantage; elongation and fatigue of the spinal extensors, with consequent increase in the thoracic spinal convexity; elongation of the trapezii, abduction of the scapulae, and shortening of the pectoral muscles. The results are ugliness, poor respiratory reserve, low vitality and a good soil for various diseases.

Hollow back is an increase in the normal lumbar forward convexity, with shortening of the lumbar spinal muscles and lengthening of the abdominal muscles. In compensation for the backward shifting of the body weight the position of round shoulders is often adopted. With the hollow back the pelvis is tilted too far forwards, and there is bad coordination of spinal flexors and extensors and hip extensors and flexors—the hip flexors are shortened and the hamstrings are lengthened. There may also be some shortening of the ilio-femoral ligaments. I have mentioned these two postural faults in some detail, as they are good examples of the undesirable chain of events that may take place from small beginnings. In flat back the opposite state of affairs holds: the flexors of the hips are too long, the hamstrings too short, so that the posture resembles that of a gorilla. There is a loss of the normal lumbar convexity.

Lambrinudi, of London, recently pointed out one possible and probable effect of the shortening of the hamstring muscles that occurs in flat back. Such a shortening causes a disability in bending forwards; so as to reach the ground, the child or young adult arches the thoracic part of the spine excessively. The continuation of this over-arching may eventually produce a vertebral epiphysitis or juvenile kyphosis, through the increased stress on the anterior parts of the vertebral bodies.

The subject of scoliosis is so vast as to defy even elementary discussion this evening. It produces the worst postural deformities, with displacement of viscera and poor health. Undoubtedly it often has its genesis in faulty attitudes assumed at an early age. It is alleged that flat-foot, and also inequality in the length of the limbs, may sometimes be the cause. It is very doubtful, however, whether shortening of a limb can cause a structural scoliosis. The correction of this deformity, on account of the associated

rotation of the vertebrae, forms one of the major problems of present-day surgery.

Whatever the nature of the postural fault with which we are dealing, in what way can physiotherapy help us? Certainly only in three ways: (i) in the correction, if possible, of the primary fault; (ii) in active exercises; (iii) in the use of heat radiation and heat conduction in association with massage.

In regard to the use of heat radiation, it has been shown that the metabolic activity of muscle is greatly accelerated by its use. Analysis of the oxygen saturation of venous blood shows that the oxygen requirement of heated muscles is 10% to 15% more than that of normal muscles. It is readily understood, however, that heat therapy has a very limited field of usefulness in postural faults. The application of heat and the use of massage are useful in local static faults, such as functional flat-foot, or for poor tone in local muscle groups.

Active muscular exercise, in the form of medical gymnastics, is the most powerful of all physio-therapeutic agents. As I have pointed out before, this calls into action the whole of the neuromuscular mechanism. By medical gymnastics are meant exercises guided by a specially trained person, whose knowledge of the muscles compares with the mechanic's knowledge of his engine. He must know the muscles in all their actions, synergisms and inhibitions. This is particularly true when he is dealing with paresis. The motto "*Primum non nocere*" is almost as important for him as for the physician or surgeon.

The functions of various muscles have not yet been fully worked out. In particular, our knowledge of the action resultant from muscle groups is hazy. By way of examples, one may first cite the supraspinatus. The action of this muscle was glibly said to be one of abduction in my day of the study of dissection. It is only recently, from study of the movements in cases of ruptured supraspinatus tendon, that it has been shown that the action of this muscle is to initiate abduction for the first 15° of this movement. This muscle fixes the head of the humerus against the glenoid socket, so that the deltoid can have a fulcrum.

The neutral position for the shoulder joint has not yet been settled by anatomists. Although in fractures we usually consider that 75° of abduction, slight external rotation and 15° of forward flexion represent the resultant line of muscle pull, work done a few years ago showed that the neutral position was more probably one of very slight abduction and slight external rotation.

The *gluteus medius* is usually referred to as an abductor of the femur on the pelvis. Its most important action, if one can use such terms, is that of lifting the pelvis on the femur during walking or other activities. Even present-day anatomy books do not describe muscle action in terms of accurate function; so that it is thrilling to note that Leonardo da Vinci, centuries ago, remarked on the importance of not considering either end of a muscle as being

fixed. The action of the muscle depends on which end is functionally fixed during any one movement. The *quadratus lumborum*, for instance, lifts the pelvis or depresses the ribs, depending for its choice of action on whether the torso or the pelvis is stationary.

No one could view the complexity of the dorsal spinal muscles without concluding that our knowledge of muscle biophysics is indeed poor. The science of biochemistry has progressed beyond our dreams of twenty years ago; but the science of biophysics in muscles has been slow in the extreme. This is probably on account of the less urgent nature of the muscle problem. This study is complex and difficult, and demands study of abstractions to which the morphologist, who deals with concrete conceptions, is not ready to devote himself. Today, owing to the work of Wolff, Amar Zuntz and Mackenzie and others, muscle physiology has reached the point where a mathematical expression can be given to many muscle events. Still, the science is halting and lame. In the field of abnormal muscle activity, still less has been done. We still apply the principles of normal muscle action to the muscles of the cripple, "who is a unit and a device of nature all his own".

The Swedish people seem to have made muscle action their own peculiar study. The system of movements prescribed provides for exercise for any group of muscles, although some anatomists cavil at their interpretations of certain muscle actions. The physician interested in correction of posture must first of all work out the muscle groups responsible for the deformity or for its maintenance. Then, under his own instruction or under the guidance of those specially trained for it, the appropriate exercises are prescribed. There should be no glib transference of the patient to the gymnast, who often enough is a retired pugilist or athlete. Corrective exercises are very different from the discipline and order exercises so well worked out in this country and in Britain for the maintenance of good posture in pupils. In connexion with corrective exercises, the surgeon would do well to mind the warning of Robert Jones, that, if a degree of resistance exists which makes it impossible by active effort or passive manipulation to place the parts in their normal anatomical relation to each other, flexibility must be restored before other treatment, gymnastic or mechanical, is attempted. In these cases the surgeon must carefully devise special manipulations and exercises to stretch adhesions and if possible to correct bony deformities.

Professor Cathcart has recently pointed out that it is not commonly appreciated that exercise is of the following three types: (i) positive, as when we perform active work, such as throwing the arm upwards; (ii) negative, as when we let the arm fall to the side again; (iii) static, as when the arm is poised in mid air in the upward swing. This is a useful classification; for it is the degree to which static effort enters into an exercise that determines its severity to the organism as a whole. If the

static element in an exercise is entirely deleted it becomes merely a pendulum rhythm with very little postural value.

The degree of endurance of the patient should be carefully estimated. Each reeducationist should ask of the physician or surgeon just how much the individual can stand. Studies of Olympic athletes show that younger men have much less stamina than older men. The ideal pulse pressure difference for heavy exercise would be about 40 millimetres of mercury.

We should evince also an active interest in the type of muscle exercise that we or our muscle educationists advise. For the young, apparatus work and single muscle exercises or "physical jerks" are necessary. After thirty-five years of age, it has been suggested, apparatus work and exercises needing great agility should be dropped, and Swedish posture exercises should be practised. To take a particular case: from a reference to what has been said on round shoulders, it is easy to deduce the form of instruction one would give the masseuse. It would include exercises to the scapular adductors, to the retractors of the shoulders and to the spinal and neck extensors. The individual patient needs individual attention.

It is quite possible for an ignorant gymnast to make the patient's posture worse in spite of exercises prescribed. For example, suppose that he is dealing with a patient with lordosis and weak abdominal muscles. The patient may be asked to perform the action of lifting one leg while standing on the other—an exercise thought by many gymnasts to give adequate work for the abdominal group of muscles. In actual practice, to bring the abdominal muscles into play in this movement it is necessary to bring the leg up violently and to flex the hips slightly, producing a bad posture and really exercising more the *gluteus medius* of the opposite side. Again, if the exercise of rotation of the spine, so as to look backwards, is prescribed in order to help spinal rotation, it should be performed in the seated position; otherwise, at least 40° of the movement takes place in the hip joints. The patient feels a false satisfaction, though he is probably not using spinal rotation at all.

The gymnast must have appreciation of the difference between strength and speed on the one hand and skill on the other. The first essential in skill is the ability to use the right muscle in the right place with the right amount of force. The force with which a muscle group acts depends on the number of fibres brought into play. One might suppose, for instance, that in flexion of the elbow, all four flexors act all the time; but this is not so. With the forearm in pronation, the biceps does not begin to act till the resistance is four pounds, while in supination it begins to act when the load reaches four ounces. Demonstration of knowledge of such important facts would reveal the difference between a masseuse and a pugilist.

A trying exercise for development of the spinal flexors is to flex the body at the hips from the supine

lying position. If this movement commences with the head, the *rectus abdominis* contracts first, the abdominal viscera are pushed against the lax oblique lateral muscles, and an incipient hernia may be precipitated.

The study of posture for the physiotherapist is inseparable from the study of gait. A non-militant democracy lacks the advantages that the youth of militant states has. The muscle and mental discipline necessary in early military training produce a posture and gait with all the signs of noble ease. Many of the people we see walking the streets with dejected and poor frames would have faced life with their chins up, if they had had the advantage of years of strict training in correct carriage.

Shoes have postural importance. The enormous number of foot deformities resulting from poor posture is undoubtedly due in great part to improper shoes. Personally, I find it very hard to get suitable reasonably priced shoes. The ideal shoe should have a squarish toe, a straight inner line, a cap following the lines of the metatarsal heads, a properly fitting vamp, a flexible welt and heels 3·1 centimetres (one and a quarter inches) high. Not only should the shoe be comfortable, but the foot should be stable in it; that is, the wearer should feel that the weight of the body on the shoe is distributed over the sole correctly. Although it is certain that all the metatarsal heads share the weight, the three points of pressure to study are the heel and the first and fifth metatarsals. Electro-basographic records of gait show that improper posture is often assumed in shoes that are apparently comfortable. In shoes that are uncomfortable, the foot more easily falls into supination or pronation, with subsequent painful defects.

In chronic debilitating diseases, like tuberculous and rheumatoid diseases of joints, the lasting effects of poor posture should ever be before our minds. It behoves us to remember that there is an optimum functional position for every stiff joint, and when the ravages of disease cannot be abated, we can make its final effects less baleful to the sufferer.

No discussion on posture would be complete without some reference to the work of that clinical pioneer on the disastrous effects of muscle stretching, Sir Robert Jones. These effects should ever be before our minds, not only when dealing with patients with paralysis, but also when dealing with the healthy, who through illness are exposed to the risk of stretch paralysis, as in decubitus peroneal paralysis. The apparently negligible postural fault of hyperextended ankle joints, in certain circumstances, is likely to lead to months of invalidity. Drunkard's wrist-drop is not to be regarded as caused by pressure on the axillary nerve, but is probably due to the subject's having lain with the wrist overflexed for long periods of time. The extensors thus are overstretched. It is a most interesting pathological fact that when the neurones are intact a muscle does not respond to an impulse. From this we would gather that posture was more important in bed than out of it.

Lastly, as one whose practice has taught him the intricacies of muscle action and the inadequacy of the academic training in muscle biophysics, may I utter a plea that muscle action be taught on the living subject? All orthopaedic surgeons will agree that group-muscle study is indispensable to a proper understanding of the muscular system. Perhaps there is no better way of concluding than with the following example:

The Process of Abduction at the Shoulder Joint:

Stage I: The supraspinatus contracts and fixes the humeral head against its fulcrum. The humerus is abducted 15° by this muscle.

Stage II: The deltoid, which has already begun its contraction, carries the humerus to 40° or 45° of abduction.

Stage III: The lower part of the *serratus anterior*, carrying the inferior angle of the scapula forwards and tilting the scapula, comes into action.

Stage IV: The humerus is abducted to 90° by the deltoid.

Stage V: The external rotators roll the humeral head, so that the greater tubercle can brush past the acromion.

Stage VI: The middle trapezius, in conjunction with the *serratus anterior*, tilts the glenoid so as to face upwards and outwards.

Stage VII: The deltoid carries the limb to full abduction.

Any breach in this harmonious chain of events will impair abduction in one or other of its stages.

METROPATHIA HÆMORRHAGICA.¹

By H. H. SCHLINK,
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ONLY within recent times has any scientific attempt been made to classify those genital-tract bleedings which display few or no obvious clinical causes in the pelvis. Gynaecologists of old were satisfied to describe them symptomatically under such loose terms as menorrhagia, metrorrhagia, polymenorrhœa and epimenorrhœa, without worrying to find out the actual cause of the bleeding. The term functional or idiopathic hæmorrhage was, and is still, being used to cover up our ignorance of conditions which we are every day called upon to treat. The ætiology of the vast amount of functional hæmorrhage is still a sealed book, except that the belief is generally gaining ground that it has something to do with the pituitary-ovarian mechanism. What causes the derangement of the physiological process is still wrapt in mystery; but we do know some of the pathological end-results in so far as the endometrium and the ovary are concerned. This evening I propose to discuss the most thoroughly worked out, at least from a pathological point of view, and best known clinical entity of the functional hæmorrhages, namely, *metropathia hæmorrhagica*.

¹ Read at a meeting of the Section of Obstetrics and Gynaecology of the New South Wales Branch of the British Medical Association on June 15, 1938.

Whenever the occasion arises to investigate abnormal haemorrhage from the genital tract, certain general points should be borne in mind:

1. A very careful clinical history should be taken, and it must be realized that most women on interrogation use the term "period" or "being unwell" even when the bleeding is quite distinct from their normal periodicity.

2. Women are often unable to distinguish uterine bleedings from those which gain origin from lesions lower down the tract, even from urethral caruncles and haemorrhoids.

3. As clinicians we should also realize that most haemorrhages come from the body of the uterus, and that those which arise from the cervix or vagina can usually be verified by digital or speculum examination.

4. It is often difficult to establish by interrogation when a normal menstrual loss becomes abnormal. In long-standing cases, apart from the number of diapers used *et cetera*, one of the surest indications is the appearance of anaemia.

5. We must classify as abnormal all interval bleedings as well as those occurring before puberty and after the menopause.

6. Lastly, we must remember that all bleedings from the cervix or vagina are due to local causes, such as cancer, ulcerations, inflammations or injuries *et cetera*, whereas bleedings from the *corpus uteri* may be either local, endocrine or general in origin.

(a) Corporeal haemorrhages due to general causes are rare and usually arise from changes in the quality or quantity of the blood stream or from atony of the uterine muscle, due to abnormal functioning of the sympathetic nervous system.

(b) The local causes of corporeal haemorrhages, namely, polypi, fibromyomata, malignant and adnexal disease, are well known to you all.

(c) The endocrine causes of functional uterine haemorrhage, according to all modern text-books, are very numerous.

This evening we are about to consider a bleeding which arises from a local endometrial change thought to be the result of abnormal endocrine action as indicated by the absence of lutein formation in the ovary accompanied by an over-production of folliculin from a persistent and enlarged follicle. Whether these changes are set in train by toxins, the result of chronic inflammation, or by an abnormal nervous prompting or by a general blood-stream intoxication, is a matter which will be touched upon when the sections of the diseased uteri or adnexa are demonstrated.

Definition of *Metropathia Haemorrhagica*.

As I indicated before, there are many forms of functional haemorrhage, the aetiology of which, except in so far as they are thought to be associated with ovarian or pituitary function, has not yet been worked out. In the past when these haemor-

rhages have been discussed, the term *metropathia haemorrhagica* has been used most unscientifically to include all sorts of doubtfully caused bleeding. As a matter of fact, *metropathia haemorrhagica* is now a definite pathological entity, and constitutes only about 25% of these functional uterine haemorrhages. The investigations of Schröder, of Leipzig, Fletcher Shaw, of Manchester, and numerous other investigators, have placed the pathology of this disease on a firm basis, and there is no excuse for confusing its bleedings with the many other forms of endocrine floodings.

Its chief characteristics, apart from irregular and excessive uterine bleeding, are polypoidal glandular hyperplasia of the endometrium, showing cystic dilatation of the glands, with superficial areas of necrosis, but an absence of all secretory hypertrophy, so that no saw-toothed glands are ever seen, and in addition there exists in one or other ovary an enlarged cystic follicle. The granulosa and *theca interna* layers of this follicle may show a faint degree of luteinization; but ovulation and regular *corpus luteum* formation are inhibited entirely.

Symptomatology of *Metropathia Haemorrhagica*.

The disease is most prevalent among women over forty years of age, the maximum incidence being in those between the ages of forty and forty-five, although it occasionally develops in girls under the age of twenty, and is not uncommon between the ages of forty-five and fifty-five, accounting for many cases of prolonged and irregular menopausal bleeding. It does not seem to be related closely to parity. The history is usually a continuous vaginal bleeding that may last for many weeks and, in 50% of the cases, is preceded by a period of amenorrhoea of about eight weeks' duration. The loss is of dark fluid blood. It is not a severe loss; but the continuous drain eventually produces anaemia. There are several atypical modes of onset: (a) the continuous bleeding may start from a normal menstrual period, or (b) it may be preceded by menorrhagia at many earlier periods.

Physical examination reveals a slightly enlarged uterus, with a cystic ovary on one or other side.

Diagnosis of *Metropathia Haemorrhagica*.

As the bleeding resembles that met with in ectopic gestation and threatened abortion, we must exclude these two conditions when making a differential diagnosis. Malignant disease must always be kept in mind.

Normal Physiology of Menstruation.

Before considering the pathological appearance of the endometrium and ovary in this disease, we might briefly recall the normal physiological working of the pituitary ovarian mechanism and its effect on the endometrium. In the schema set out below, the various processes of the menstrual cycle are shown.

When pregnancy does not occur.	When pregnancy occurs.
Menstrual phase (blood and uterine débris).	{ (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)
Regenerative phase (repair).	Menstrual phase (blood and uterine débris).
Proliferative phase (hypertrophy).	Regenerative phase (repair).
Ovulation (secretory phase)	Proliferative phase (hypertrophy).
Marked hypertrophy of mucous due to stimulus of <i>corpus luteum</i> and possibly also of anterior lobe of pituitary gland; crenulations in glands develop; epithelial cells become filled with mucus.	Ovulation (decidual phase)
Stroma cells resembling decidual cells collect in the compact layer of functional zone. Mucous membrane more or less stationary in hypertrophic condition. Lymphocytes and leucocytes found in last few days.	Zygote in tube.
	Zygote in uterus, free, not imbedded. Excessive hypertrophy of mucous of uterus due to stimuli from (i) <i>corpus luteum</i> , (ii) anterior lobe of pituitary, (iii) zygote.
	Zygote now embeds by means of trophoblast. Mucous further hypertrophies. Sinuses in uterus form, and villi of chorion appear as buds extending into blood spaces.
	{ (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27)

In Figure I there is a diagrammatic representation of the menstrual cycle. All we need note for the purposes of our discussion this evening are the various stages of the cycle that occur when

hormones secreted by the ovary: folliculin or oestrin, produced by the ripening follicle, and lutein or progestin, secreted by the *corpus luteum*.

Just as the endometrium is the mirror of the ovary, so the changes in the ovary which control the menstrual cycle are the result of the influence of secretions manufactured by the anterior lobe of the pituitary gland.

The hormone of this region of the pituitary gland exerts two distinct reactions in the ovary. The acid extract called prolan A controls the ripening of the follicles, hence the ovarian hormone oestrin; and the alkaline extract prolan B controls the formation of the *corpus luteum* and accounts for the progestin or lutein hormone. It is essential to keep before your mind this pituitary-ovarian influence on the endometrium when studying any case of functional haemorrhage.¹

Aetiology and Pathology of Metropathia Haemorrhagica.

In *metropathia haemorrhagica* something goes wrong with the pituitary-ovarian mechanism. Whether this is caused by toxic or nervous influences is unknown. The result is that one or

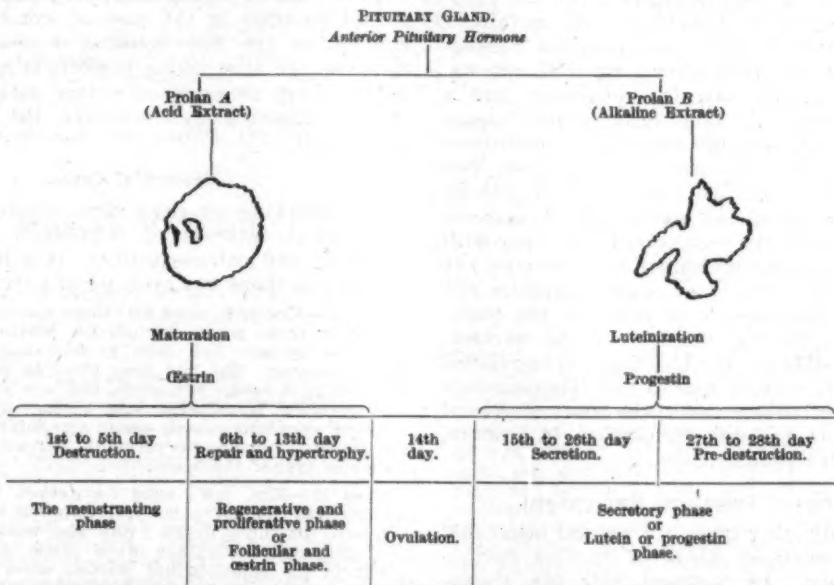


FIGURE I.
A diagrammatic representation of the menstrual cycle.

pregnancy does not take place. The menstrual phase, or phase of destruction, lasts, on an average, five days. The regenerative and proliferative phases stimulated by folliculin secretion then set in until ovulation on or about the fourteenth day takes place, when the secretory phase makes its appearance, controlled by the manufacture of the *corpus luteum* hormone lutein. This stage lasts from the fifteenth day to the twenty-eighth day, the last forty-eight hours being devoted to preparation for the next menstrual period and being called by some authors the pre-destructive phase. These changes in the endometrium are produced by the two

more follicles persist and enlarge, with an accompanying excess of oestrin or folliculin secretion. No ovulation takes place, and consequently no *corpus luteum* is formed, and there is an absence of progestin or lutein hormone. The continued over-production of oestrin by the persistent ripening follicle, without any counterbalancing lutein formation, produces the characteristic reaction in the endometrium of *metropathia haemorrhagica*.

¹ At this point Dr. Geoffrey Davies demonstrated the appearances of the endometrium at various stages of the normal menstrual cycle, and the typical appearances of the endometrium and the characteristic follicular cyst of the ovary in *metropathia haemorrhagica*.

Before studying these changes I might mention that the *granulosa* and *theca interna* layers of the enlarged persistent follicular cyst occasionally give the appearance of faint luteinization. Usually, however, no lutein cells can be discovered even after a prolonged search of both ovaries. The over-stimulation of the endometrium by oestrin makes the proliferative phase of the menstrual cycle dominate the picture and causes the non-appearance of the secretory phase. It is the absence of the normal secretory "topping off" caused by the lutein hormone which is responsible for the characteristic appearance of the endometrium in this disease.

The endometrium is greatly thickened, and may measure up to fifteen millimetres. Sometimes polypoidal protrusions appear on the surface. Microscopically it presents a highly glandular appearance. The glands have a disorderly arrangement; they are numerous, and vary greatly in size and shape. The lining epithelium may be several layers thick, so-called pseudo-stratification; but none has the corkscrew and saw-toothed appearance characteristic of the secretory phase. Cystic dilatation of the glands in the deeper layers gives the endometrium a Swiss-cheese appearance, and certain of the glands may penetrate the myometrium (adenomyosis). The stroma cells show numerous mitoses, and there are extreme vascular congestion and a good deal of oedema. As there is no *corpus luteum* formation, decidual cells are absent. If bleeding is occurring when the curettage is being done, two additional changes will be observed: (i) patchy necrosis of the superficial layers and thrombosis of the small vessels, (ii) extensive infiltration with polymorphonuclear and mononuclear leucocytes, but no plasma cells. The two most characteristic features of the microscopic picture are the cystic glands and the patchy necrosis of the surface, which is responsible for the bleeding. What causes the necrosis? It may be due to the disappearance of *corpus luteum* influence as in the onset of normal menstruation, or to over-stimulation by oestrin, with its excessive proliferation.

Other Forms of Functional Haemorrhage.

There are many other types of irregular menstrual bleedings or prolonged bouts of uterine haemorrhage which might be confused with the disease just described. Although they are thought to represent other manifestations of ovarian dysfunction, none displays the definite characteristics of *metropathia haemorrhagica*. No doubt further study will in the near future elucidate their aetiology and pathology, and make them as well-defined clinical entities as the condition I have been discussing. In one particular group ovulation is inhibited and a follicular cyst formed in the ovary just as in *metropathia haemorrhagica*; but there are no characteristic changes in the endometrium beyond the formation of some areas of superficial necrosis as found in normal menstruation. These cases resemble the anovular bleedings found in monkeys of the *Macacus* species.

Treatment of Metropathia Haemorrhagica.

1. *Curettage*: Curettage should always be done, not only to confirm the diagnosis, but because it frequently acts therapeutically.

2. *Hormone Therapy*: As there is no *corpus luteum* formed in the ovaries and there are no secretory changes in the endometrium indicating the absence of *corpus luteum* hormone, it is reasonable to administer such preparations as "Progestin" and "Proluton", especially to the young.

3. *Radium Therapy*: In the young, small doses of radium therapy, sufficient to produce a temporary ovarian sterility, should be tried. In severe cases in subjects over the age of forty years, doses large enough to produce radiological castration are justifiable. In such cases we must always be prepared to meet with intractable discharge and severe uterine cramps some time later. These symptoms are sometimes so severe that hysterectomy must be performed.

4. *Operative Treatment*: The sovereign remedy is hysterectomy for women over forty years of age. It goes without saying that every palliative remedy should be tried in the case of women under that age before one has recourse to such a radical measure. In very young subjects it might be justifiable to try thorough curettage and the excision of the offending cyst or even the ovary which contains it.

Reports of Cases.

The following six cases were selected as showing the typical features of Schröder's disease, both clinically and pathologically.¹ It will be seen that in all cases there was evidence of past inflammation.

CASE I.—Mrs. G.S., aged fifty-three years, gave a history of two or three missed periods the previous year. Since then the periods had been profuse and she had dysmenorrhœa. She had been bleeding *per vaginam* for fourteen days before admission, and was so exsanguinated that a blood transfusion was given. The pathological findings were pronounced cystic glandular hyperplasia of the endometrium, chronic cervicitis, fibrosis of the tube and follicular cyst of the ovary.

CASE II.—Mrs. A.F., aged forty-seven years, had had amenorrhœa for three months, followed by bleeding *per vaginam* for three weeks. She was weak and lethargic. The pathological findings were cystic glandular hyperplasia of the endometrium, fibrosis of the tube and follicular cyst of an ovary.

CASE III.—Mrs. M.R., aged fifty-six years, had suffered from irregular menstruation for the previous year. The intervals were of six months, and the flow lasted two to three weeks. She had suffered from constant bleeding for the previous three months. Pathological examination revealed cystic glandular hyperplasia of the endometrium, fibroids and fibrosis in the myometrium, chronic salpingitis and cervicitis and a follicular cyst in the ovary.

CASE IV.—Mrs. A.W., aged forty-six years, had suffered from haemorrhage *per vaginam* for seven months. The pathological findings were cystic glandular hyperplasia of the endometrium, chronic cervicitis, fibrosis in a tube, and oedema in an ovary. There was no evidence of luteinization.

¹ The pathological specimens obtained from the patients whose histories are recorded were shown by Dr. Muriel McIlrath.

CASE V.—Mrs. A.W., aged forty-three years, had had continuous bleeding *per vaginam* for thirteen weeks. The pathological examination revealed cystic glandular hyperplasia of the endometrium, *fibrosis uteri*, chronic cervicitis, fibrosis in a tube and a large follicular cyst of an ovary. This cyst showed a tendency to luteinization at one end, a finding which has caused confusion among observers. In this case, however, the tendency was very slight.

CASE VI.—Mrs. M.B., aged fifty-one years, was liable to suffer a heavy loss of blood at her menstrual periods. She had had amenorrhoea for three months about six months before; since then she had bled freely again. The pathological findings were cystic glandular hyperplasia of the endometrium, fibrosis in the tubes and myometrium and a large follicular cyst in an ovary.

Finally, two cases of granulosa-cell carcinoma of the ovary are included, as they show the typical cystic changes in the endometrium, demonstrating, therefore, their endocrine origin and nature.

CASE VII.—Mrs. K.N., aged forty-two years, had for the past seven months suffered from hemorrhage *per vaginam* for three weeks, with intervals of freedom of two or three months. The patient was very anaemic; a blood transfusion was necessary. The pathological examination revealed cystic glandular hyperplasia of the endometrium, fibromyoma in the myometrium, salpingitis, cervicitis, follicular cyst in one ovary and a granulosa-cell carcinoma in the other.

CASE VIII.—Mrs. M.B., aged sixty-five years, had suffered from attacks of colicky abdominal pain and vomiting for six months. She complained of a "lump" in her abdomen. The pathological findings were cystic glandular hyperplasia of the endometrium, oedema and fibrosis in a tube and granulosa-cell carcinoma of the left ovary.

Reports of Cases.

PATHOLOGICAL REPORTS FROM THE CHILDREN'S HOSPITAL, MELBOURNE.

By REGINALD WEBSTER, M.D., D.Sc., F.R.A.C.P.,
Pathologist, Children's Hospital, Melbourne.

XVII.—NEUROBLASTOMA.

In the opinion of many who have seen it, the best specimen in the pathological museum at the Children's Hospital, Melbourne, considered either as a representative example of the condition which it illustrates, or as an achievement in colour preparation and mounting on the part of Mr. H. Weir, is one of adrenal neuroblastoma (Figure XXVII). The tumour arose in the right suprarenal and by malignant permeation of the liver occasioned a degree of hepatic enlargement such as I have never seen equalled, or even approached, in a child. The manner in which the witnesses of the autopsy contemplated the extreme example of hepatomegaly which it disclosed was reminiscent of that in which the local population viewed the erudition of Oliver Goldsmith's village schoolmaster: "still they gazed and still the wonder grew."

The patient, Valerie C., was a little girl, aged four and a half years, whose case has already been recorded and discussed from the clinical aspect by Dr. Norman Cust.¹⁰ With his report, Dr. Cust published a photograph, secured at the autopsy by Dr. Ian Wood, which portrayed the enormous size of the liver with an adequacy beyond the most gifted powers of verbal description. A photomicrograph which I prepared from a microscopic section of the

primary adrenal tumour was also published with Cust's article, and showed the richly cellular, predominantly round-celled histology and diagnostic "rosettes" of neuroblastoma.

It so happened that the preparation of the histological section from this child's liver coincided with that from the liver of a boy who had died of acute lymphoblastic leukaemia, and the extent and uniformity of the neuroblastomatous permeation were such that I found myself mistaking the section of the liver thus affected for that of the leukaemia.

The situation of the primary tumour of the adrenal is shown in Figure XXVII, and in addition to its universal penetration of the liver, the neoplasm metastasized in the adjacent lymphatic glands, the lymph nodes of the anterior mediastinum, and the soft tissues of both orbital cavities. There were no bony metastases. In the massive involvement of the liver, which viscus, while remaining of smooth surface and normal configuration, presented a yellowish mottling throughout rather than discrete nodular deposits, this tumour displayed the features of those generally associated with the "Pepper syndrome"; but in respect of the orbital metastases, with resulting ecchymosis and proptosis, the clinical characters were distinctly of the "Hutchison" type. In the original communication,¹¹ which gained a place for the name of William Pepper on the eponymous register, that author discussed "six cases of congenital sarcoma of the liver and suprarenal" and definitely stated that "no other organ or part of the body was involved by the new growth". From the case of Valerie C., the child who furnished the specimen illustrated in Figure XXVII, it may be concluded that right-sided adrenal neuroblastoma which involve the liver in the manner distinctive of the "Pepper" type, do not invariably limit their metastases to the abdomen.

In a valuable early contribution to the study of this subject, which he treated as carcinoma originating in the suprarenal medulla in children, Frew¹² reviewed the autopsy findings in 51 children, in 29 of whom the primary adrenal tumour was situated on the right side, as against 22 in whom the left adrenal was primarily involved. He maintained that the disease gave rise to two entirely different "clinical syndromes", based on equally different pathological features, according as the right or left suprarenal had been the site of the primary growth. When the tumour arose in the right adrenal secondary deposits were likely to occur along the upper surface of the liver and in both lungs; the right lymphatic duct and certain of its tributaries were prone to be implicated. In only a few instances were the cranial bones involved. Another feature of right-sided tumours was a greater likelihood of their localization to the abdomen, as occurred in the six infants upon whom Pepper based his original paper. Left-sided adrenal growths gave rise to metastatic deposits in the liver, ribs and cranial bones, and in their dissemination were apt to embrace the thoracic duct. Frew further maintained that spread was entirely by the lymphatic system and that all of the structures mentioned above were affected through their lymphatic vessels; but this view of the mode of dissemination of these tumours has been seriously challenged.

Frew's careful autopsies and detailed analysis of recorded cases gained wide acceptance for his work, the merit of which is in no way depreciated by the fact that in the ensuing years it became apparent that no sharp division could be made between the clinical effects of adrenal neuroblastoma of the right and left side respectively. It remains true that in patients displaying the clinical features of the "Pepper" type, with universal permeation of the liver producing hepatic enlargement of colossal dimensions, the neuroblastoma will be found to have originated in the right adrenal; but in those presenting Hutchisonian skull tumours and other bony metastases, the primary tumour may be found in either suprarenal. Indeed, in Robert Hutchison's original paper, based on ten cases of "suprarenal sarcoma in children with metastases in the skull", four out of the ten subjects displayed right-sided suprarenal tumours.

Such was the situation of the primary growth in a boy, a discussion of the pathological aspects of whose case is

the main object of the present communication, deferred perhaps unduly because I could not resist the temptation to publish a photographic representation of the museum's best specimen.

Fred W., aged eight years, occupied a bed in the Children's Hospital for a period of six months in 1930, and the elucidation of his pathological condition from the autopsy material does not seem, in retrospect, to have been nearly so difficult a task as that which now confronts me of sifting the wheat from the chaff in a long clinical record and presenting the essentials within a reasonable compass.

The boy was admitted to one of the medical wards on May 22, 1930, febrile, anaemic and vaguely ill, and for three weeks presented a difficult diagnostic problem, the solution of which appeared to have been effected by the recovery of a haemolytic streptococcus by blood culture on June 13. One week before, he had complained of pain in the region of the greater trochanter of the left femur, a significant symptom in the light of subsequent events; but a radiogram of the pelvis and hip joints taken at this time was not regarded as showing any diagnostic features. The boy pursued a febrile course, becoming very thin and anaemic; but his temperature gradually subsided. On August 8 a note was entered that he had been afebrile for some days and that he appeared to be convalescent.

Up to this point the diagnosis of streptococcal septicaemia seemed quite satisfactory, and it was natural that later developments in the boy's illness should be regarded as due most probably to the activities of the streptococcus which had been recovered from the blood. Early in September his temperature rose again, but at this time no organism could be obtained by blood culture. A note of September 26 recorded the presence of several hard and tender lumps on the head; it was also observed that the cervical glands were enlarged. Ophthalmoscopic examination by Dr. M. C. Gardner disclosed pronounced papilloedema in both eyes.

The problem presented at this stage was that of a boy who had been ill for four months, in whom streptococcal septicaemia had been demonstrated, and who now displayed enlarged cervical glands and lumps on the head. The cranial nodules advanced in size with some rapidity, and on October 6 a gland was excised from the neck and sent to me for examination. The central portion of the glandular tissue was softened and glairy in character, and having failed to detect any microorganism by various cultural methods, I proceeded with histological section. In this I was impressed by the lymphoid hyperplasia and interstitial haemorrhage, reporting in those terms; but I failed to appreciate the malignant nature of the process, although the clinicians in charge of the boy were now abandoning the idea of metastatic septic foci and were very suspicious of malignant disease. Chloroma was suggested, but no support for such a diagnosis was forthcoming from repeated examinations of the boy's blood.

Further complaint of pain in the left inguinal region and the upper portion of the left thigh led to another radiographic examination, which on this occasion embraced the pelvis and femora, both knees and the skull. The radiological report recorded patchy rarefaction in both femora in the region of the greater trochanter, appearances in the films of the knees suggesting a process of chronic osteitis (Figure XXVIII), and in the skull, widespread osteoporosis over the frontal and parietal bones (Figure XXIX).

The boy died on November 6, 1930, his protracted illness having reduced him to a state of extreme emaciation. In my absence from the hospital the autopsy was carried out by Dr. Eric Price, at that time resident medical officer at the Children's Hospital. Dr. Price's autopsy record describes the liver as very large and the seat of numerous small white nodules, the largest of which were not more than a half centimetre in diameter. There was more than a litre of blood-stained fluid in the peritoneal cavity. What appeared to be the primary growth was situated at the upper pole of the right kidney, was adherent to the liver and perforating the diaphragm, on the pleural surface of which were a number of secondary nodules. The

invasion of the parietal pleura covering the diaphragm had occasioned an effusion of blood-stained fluid into the pleural cavity on the right side. The cut surface of the presumed primary neoplasm showed numerous areas of focal degeneration and softening, mingled with hemorrhagic extravasations. The presence of spicules of gritty material was revealed by passing the edge of the knife over the cut surface of the tumour. Implication of the prevertebral and mesenteric glands had produced a second large retroperitoneal mass, and further involvement of lymph glands was evident in the tracheo-bronchial and cervical glands of both sides. Bony metastases were widespread in the skull, proximal portions of both femora, and bilaterally in femora, tibiae and fibulae in the regions of the knee joints. The calvarium was extensively invaded, and in places completely replaced, by neoplasm which was in this situation extremely hemorrhagic and of a purple colour. The tumours projected under the pericranium externally, as they protruded within the skull, compressing but not invading the brain. They were also present in the orbital plates of the frontal bones, the *faix cerebri*, and *tentorium cerebelli*. The bony metastases as they appeared radiologically are illustrated in Figures XXVIII and XXIX.

Dr. Price concluded that the primary growth appeared to be attached to the upper pole of the right kidney rather than arising in it; in other words, it was in the situation of the suprarenal body on the right side. This estimate of the origin of the growth was confirmed by the examination of microscopic sections which I subsequently prepared, a photomicrograph from one of which is reproduced in Figure XXX. The highly cellular round-celled growth, with a typical "rosette", formed by the interlacing of the fibrils into which many of the cells are prolonged and arrangement of the cells at the periphery, is well shown in the illustration. Elsewhere, in one or other of the sections, fibrils arranged in bundles and immature nerve cells contributed to make the complete histological picture of a neuroblastoma. The characteristic fibrils of these tumours, which do not stain like neuroglia or connective tissue by specific staining methods, such as those of Mallory, tend to be unevenly distributed in the tissue. They may escape recognition as the result of degeneration occasioned by *post mortem* changes, and this is particularly true of the fibrils in the central portions of the "rosettes".

There is no reason to doubt that in the course of his six months' illness this boy passed through a septicaemia of obscure origin. At the time of the recovery of the *Streptococcus haemolyticus* by blood culture this finding was consistent with his clinical condition. It would seem improbable that the subsequent appearance of a malignant tumour was related to the systemic sepsis; but it can be well understood that the natural tendency in diagnosis was to interpret the enlarged glands, swellings on the head and lesions in the femora and tibiae as metastatic septic foci. At no time had there been the protosis or orbital ecchymosis which must surely have suggested "Hutchison's skull tumours", metastases of neuroblastoma, to some one of the many who had become interested in the clinical problem which the boy presented. As already indicated, chloroma was suggested. Considerations of space compel me to omit many details of the investigations and treatment instituted for this boy.

Neuroblastoma, perhaps the commonest retroperitoneal tumour in childhood, with its tendency to widespread metastases and predilection for the bones as sites of secondary deposits, has long been recognized. Long before the contributions of Pepper¹⁰ (1901) and Hutchison¹¹ (1907) appeared there had been reports such as those of "multiple sarcoma in a child", and "sarcoma of the skeleton in a child". No less than three such reports are to be found in the volume of *Transactions of the Pathological Society of London* for 1885, and there is no doubt that they deal with a condition identical with that under discussion.

The essential nature of this tumour, however, was not appreciated until it was elucidated by the work of J. H. Wright¹² in 1910. Marchand had indeed suggested its true origin in 1891; but it remained for Wright, in an illuminating and conclusive paper, to show that the

essential cells of the tumour were more or less undifferentiated nerve cells, or neuroblasts. He described in detail histological characters which have been abundantly confirmed by innumerable microscopists since Wright supplied the key to the problem. The occurrence of the neoplasm in the adrenal is explained by the invasion of the *Anlage* of the cortex by undifferentiated cells of the sympathetic nervous system to form the adrenal medulla.

Many examples of this type of malignant disease in childhood are on record; but the two reports which I have found most interesting are those of F. Parkes Weber⁽¹⁾ and of Colville and Willis.⁽²⁾

The particular interest of the child whose clinical record furnished the basis of Parkes Weber's report was that she furnished an almost exact parallel to the case of Valerie C., as reported by Norman Cust.⁽³⁾ The adrenal tumour and enormously enlarged liver of Cust's patient are illustrated in Figure XXVII. Parkes Weber described the immense, symmetrically enlarged liver, diffusely and universally invaded by neoplastic cells in such a manner as to suggest a leucämic infiltration in its microscopic appearances. In both children orbital metastases, proptosis and ecchymosis occurred; both displayed right-sided suprarenal neoplasms, and both exhibited the "Pepper" type of hepatic involvement with metastases of the "Hutchison" distribution.

Those who would wish to retain the distinction between the "Hutchison" and "Pepper" syndromes for clinical purposes must recognize that the division is by no means absolute, and particularly that right-sided adrenal neuroblastoma differ little from those of the left side in their metastatic proclivities.

Without doubt the most absorbingly interesting and most exhaustively studied individual instance of neuroblastoma in a child is that reported by Colville and Willis.⁽⁴⁾ Clinical and autopsy details of this patient are also to be found in Dr. R. A. Willis's book, "The Spread of Tumours in the Human Body",⁽⁵⁾ where she figures as Case 304 in the appendix to the book. This child is presented as one whose symptoms abundantly justified a clinical diagnosis of "Ewing's sarcoma" of the femur. It was disclosed, however, by a carefully conducted autopsy, that the primary tumour was an adrenal neuroblastoma which had metastasized in broadcast fashion. One of the secondary deposits, that in the right femur, had advanced with excessive rapidity to produce an enormous fusiform soft white growth, which enveloped the whole of the shaft of the right femur and invaded the soft tissues. All other bones of the skeleton which were examined presented similar tumour deposits, situated mainly beneath intact periosteum; but that in the right femur had attained such large dimensions that it assumed clinical predominance as a primary tumour of the bone. It is noteworthy that the adrenal tumour, situated on the right side, was small—a lobulated tumour, three centimetres in diameter. After detailing the convincing histological evidence of the nature of the adrenal tumour as a neuroblastoma, Dr. Willis draws attention to the fact that the skeletal metastases of neuroblastoma may present all the clinical characters of the "Ewing" tumour. His presentation of the thesis that the majority of tumours manifesting the clinical features associated with the "Ewing" tumour are metastatic in character, and that neuroblastoma is often the hidden primary growth, makes stimulating reading, and will be found in the book to which I have already referred. Willis also discusses the mode of spread of tumours which are prone to give rise to metastases in bone, and advances cogent arguments in favour of haem dissemination by blood-borne tumour emboli as against the Handley doctrine of continuous and often retrograde permeation of lymphatic vessels.

Neuroblastoma is a tumour which should excite the interest of radiologists, and a communication which details the radiography of the bony metastases is that of Holmes and Dresser.⁽⁶⁾ The authors named describe the radiograms as characteristic and distinctive. Any attempt to discuss the radiological aspects of neuroblastoma would soon involve me in serious difficulties. In Puccini's masterpiece of orchestration and haunting melody, "Madam

Butterfly", the consul, Sharpless, attempts to evade a difficult situation by protesting that he had "never studied ornithology". Similarly, I would disclaim ever having studied radiology, and feel that I can do no more than supply the reference for those who may be interested in this phase of the question.

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Reviews.

RADIOLOGY OF THE ALIMENTARY TRACT.

"CLINICAL ROENTGENOLOGY OF THE DIGESTIVE TRACT", by Dr. Maurice Feldman, is an industrious and exhaustive review of the literature relating to the X ray examination of the oesophagus, stomach, duodenum, gall-bladder and intestines, illuminated by the clinical experience gained in the performance of some 20,000 gastro-intestinal examinations.¹

The author's method is to deal with each clinical entity in a separate chapter and to present in each of these chapters a complete review of current opinion, thus bringing together in one volume all the information previously available only from scattered sources. The book thus fills a gap, for no recent work has covered the field in such a thorough manner. The pages abound in citations from the authorities, but the method is sometimes carried to extremes. It becomes tiring to read page after page of what "Stephens reports", "Jones emphasizes" and "Smith points out", and to find no practical attempt on the part of the author to integrate the results of all these publications and no statements of his beliefs. Doctor Feldman does not possess the gift of integration. He is, in fact, so anxious to miss no contemporary opinion that he entirely neglects to state his own opinion. This may be mere modesty; but a little human conviction here and there would lighten many places where the reading is really heavy going and where constellations of proper names of little significance besprinkle the text as plentifully as stars in a starry sky.

The book, therefore, is an entirely impersonal though complete work of reference, rather diffuse in treatment and often contradictory in its portrayal of differing authorities. For all that it is an excellent compilation of present-day knowledge, which leaves us to do our own editing and to draw our own conclusions wherever the material wants definition. It is certainly not a book for the early student, as it lacks that dogmatic clearness so necessary to early instruction, but for the advanced radiologist or gastro-enterologist the work will be a valuable and convenient resort in time of need. The bibliographies, which contain a large proportion of recent

¹ "Clinical Roentgenology of the Digestive Tract", by M. Feldman, M.D.; 1938. London: Baillière, Tindall and Cox. Demy 8vo, pp. 1030, with illustrations. Price: 45s. net.

English and American references, should be particularly useful.

Within the limits outlined this volume should be an extremely useful addition to any radiologist's bookshelf. It is well published and the reproductions of X ray films are very good, though some of them are reproduced as positives and some as negatives. In conclusion one extract may be given from the foreword, the wisdom of which is evident, at least to every practising radiologist: "So important has the roentgen ray investigation become in the study of digestive disturbances that all patients in whom digestive symptoms of a subacute and more particularly of a chronic type occur, even though these be of a minor character whether continuous or recurrent, should be studied by this method."

CHEMICAL ANALYSIS.

For the teaching of chemical analysis to medical students there is no doubt about the usefulness of clear and explicit directions such as are given in Illingworth's "Chemical Analysis for Medical Students".¹ This systematic little book includes sections on qualitative inorganic analysis, qualitative organic analysis and volumetric analysis. In a foreword Professor Barger commends the work of the author in preparing the book, but he himself accepts some responsibility for the selection of its subject matter, which follows the programme in use in the University of Edinburgh. It is this very point which requires some critical examination. What exactly is the value of teaching medical students qualitative and volumetric chemical analysis? Would not a selected course of experiments illustrating the subject matter of the lecture course be of greater value? The approach to practical chemistry by way of analysis has certainly the sanction of long-established custom and may even now be the most convenient method especially with large classes. It does seem, however, to involve undue attention to one specialized branch of chemical laboratory work and one which is hardly the most suitable for helping students to understand fundamental chemical principles.

THE ALIMENTARY CANAL.

"SECONDARY GASTRO-INTESTINAL DISORDERS", by Friedenwald, Morrison and Morrison, is a book of more than ordinary merit.² The authors have done a service in demonstrating the close relationship that exists between digestive disorders and disease processes in other parts of the body. From their experience of many years they are able to state that more than half of the patients presenting digestive symptoms are suffering from gastro-intestinal disturbance secondary to some other condition. They point out that many errors in diagnosis are due to failure to recognize this fact and so to make a complete examination.

Among the conditions in which the symptoms of secondary gastro-intestinal disturbance are common and indeed often overshadow those of the primary disease, the authors include cardiac disease, pulmonary tuberculosis, liver and gall-bladder disease, intestinal disease, focal infections, genito-urinary disease, diseases of female pelvic organs, diseases of the menopause, disorders of function of the ductless glands, syphilis, anaemia and certain deficiency disturbances, nervous affections, skin and eye diseases, and allergic states due to sensitivity to food. This is a formidable list, but the authors state that it by no means covers the whole field of these disturbances. Nevertheless they give a very comprehensive review of the subject.

¹ "Chemical Analysis for Medical Students: Qualitative and Volumetric", by R. E. Illingworth, Ph.D., B.Sc., with a foreword by G. Barger, Sc.D., LL.D., F.R.S.; 1938. Edinburgh: E. and S. Livingstone. Crown 8vo, pp. 153. Price: 5s. net.

² "Clinics on Secondary Gastro-Intestinal Disorders: Reciprocal Relationships", by J. Friedenwald, M.D., T. H. Morrison, M.D., and S. Morrison, M.D.; 1938. London: Baillière, Tindall and Cox. Medium 8vo, pp. 262. Price: 12s. 6d. net.

The book is well balanced and each subject in turn is dealt with systematically and lucidly. Many case histories are given which clarify and give point to the text. Most of the chapters conclude with an interesting and instructive summary, and all with a very complete bibliography. In a final summary the authors complete an excellent book by reaffirming that a very close relationship exists between the digestive tract and other organs of the body and enumerate the ways in which this is brought about. When digestive symptoms are manifested, they say, it is imperative to eliminate other primary lesions, and this can be done only by a complete survey of the entire body.

This is a book full of sound information concerning gastro-intestinal disturbances and their relation to other disorders.

CARE OF THE INFANT.

"YOUR BABY" is a practical guide for mothers, written by Miss Muriel Peck, who is the Assistant Director of Maternal Welfare in Victoria.¹ The advice given by her is sound and practical and has been carefully tested at many infant welfare centres. The book opens in the customary fashion with a chapter on antenatal care written for the mothers themselves. Most of the author's advice is sound; but women suffering from severe morning sickness should see a doctor immediately and not wait for three months to pass. Clear directions are given for successful breast feeding; nowadays no woman has any excuse for weaning her baby through lack of knowledge.

Sister Peck caters especially for those infants who live in hot climates. She insists that much care is needed in the administration of fats in warm weather, a matter which is often ignored by nurses and practitioners. She describes the construction of a home-made cooler from a kerosene tin and towelling; her patent safety cot should be a boon in districts where flies and mosquitoes abound.

Another question which receives her attention is the difficulty of obtaining green vegetables in drought-stricken and tropical areas. She makes the novel suggestion that cress and peas may be grown on a damp blanket and used when an inch high. The directions for making the simple milk mixtures which she advises for artificial feeding are easy to follow; evidently the elaborate process of "humanizing" milk is gradually being discarded by infant-welfare authorities. She also describes the method of "Bengerizing" milk, which can be digested by some infants only when it is treated in this way.

There are good chapters on feeding in early childhood. The author's series of recipes should appeal to most mothers. In fact she caters for all aspects of the toddler's life, and the section on the care of the feet is particularly interesting. Mothers, nurses and medical practitioners will find this little book of the greatest assistance in the care of infants and the young child.

SURGERY.

THE fourth edition of "A Short Practice of Surgery", by Bailey and Love, is an outstanding summary of the subject of surgery.² Its success is partly due to the excellent use of light and heavy type and of numerals to mark off the paragraphs, but mainly to the style in which the book is written. This edition has an innovation which could well be adopted by the writers of all text-books. At the bottom of many pages are brief historical notes. These are short and of absorbing interest and greatly enhance the value of the book.

¹ "Your Baby: A Practical Guide to Mothers and Nurses", by M. A. Peck, S.R.N., with a foreword by V. Scantlebury, M.D.; 1938. Melbourne: The Woman's World Proprietary Limited. Crown 8vo, pp. 160, with illustrations. Price: 2s. 6d. net.

² "A Short Practice of Surgery", by H. Bailey, F.R.C.S., and R. J. McN. Love, M.S., F.R.C.S.; Fourth Edition; 1938. London: H. K. Lewis and Company Limited. Demy 8vo, pp. 1004, with 518 illustrations, of which 109 are coloured. Price: 28s. net.

The Medical Journal of Australia

SATURDAY, FEBRUARY 4, 1939.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

MATERNAL WELFARE: A NOTABLE ADVANCE.

DURING the last few weeks the Department of Public Health of New South Wales has introduced a scheme for the reduction of maternal mortality, and it has issued a memorandum for the information and guidance of medical practitioners. This constructive measure is bold in its conception, yet withal simple; it is also further evidence of the Government's desire to enlist the cooperation of the practising members of the medical profession in order to reduce maternal mortality and morbidity. In bringing this scheme to the notice of readers, we would point out that it must to a certain extent be experimental. At first the scheme will apply only to the metropolitan district of Sydney. Should success follow, an effort will probably be made to extend it to other parts of the State where facilities are available. The progress of events will therefore be watched with hopeful interest, not only by practitioners in all parts of New South Wales, but by those in other States.

The scheme had its origin in the recommendations of a committee appointed by the New South Wales Branch of the British Medical Association to inquire into maternal and infant welfare. (See THE MEDICAL JOURNAL OF AUSTRALIA, April 30, 1938.) The committee recommended *inter alia*: that provision should be made for the services of a consultant when considered necessary by the practitioner in attendance and when the patient was unable to pay the usual fee; that mobile blood transfusion units should be organized and attached to certain specified hospitals; that facilities should be provided for the early bacteriological diagnosis of puerperal infection, and that this should be followed by an investigation of all infections by the haemolytic streptococcus; that all maternal deaths should be investigated so that all the circumstances of each case might be explored. These recommendations have been adopted. The memorandum issued to practitioners contains a list of consultants who have agreed to cooperate in the scheme and to accept a modified fee, which will be paid by the Department. Any one of the consultants on the list may be called by a medical practitioner who is faced with an obstetric difficulty or emergency, provided the patient is not able to pay the consultant's fee, either wholly or in part. In the Department's memorandum two statements dealing with consultations should be emphasized. In the first place, to call a consultant in a difficult case is no reflection on the ability of the attendant obstetrician, but rather an essential step in the national effort to reduce maternal mortality. Secondly, medical practitioners should, as far as possible, avoid dealing with difficult or complicated labour in places or under conditions which are not satisfactory. Mobile blood transfusion units will be established at the Women's Hospital, Crown Street, and at the Royal Hospital for Women, Paddington. (The latter hospital has agreed to cooperate since the memorandum was issued.) This service will be available at any hour of the day or night on the request of a medical practitioner. Blood donors will be found and submitted to necessary tests; they will be paid at the rate of £3 per pint of blood. Should the patient not be able to

pay this amount, payment will be made by the Department. Medical practitioners in and around Sydney are asked to make themselves thoroughly conversant with the Department's directions dealing with blood transfusion, so that difficulty and delay may be avoided. Directions are also given for the procedure to be followed in the bacteriological diagnosis of suspected puerperal infection. Finally, the Department of Public Health will set up a special committee, consisting of representatives of the Department, two consulting obstetricians, one of whom will be the Professor of Obstetrics in the University of Sydney, and a general practitioner. This committee will review all maternal deaths and will discuss with attendant practitioner and consultant various lines of treatment and make suggestions for future guidance. By this means it is hoped to discover any loopholes in the scheme and to guard against future infections and deaths.

This departmental scheme is without doubt one of the most important preventive measures that have yet been undertaken in Australian obstetrics, in that it makes available to every woman in the area covered by it the expert attention and investigation obtainable at modern obstetric hospitals. It will be to the lasting credit of the Minister of Health and of the Director-General of his department. Medical practitioners will surely give their active cooperation, for, in the words of Dr. E. Sydney Morris: "Provided that all members of the profession will consider themselves as members of a team, cooperating for the public good in a work of national importance, the success of the scheme is assured."

Current Comment.

THE PREVENTION OF WHOOPING COUGH.

Of recent years a renewal of interest in the possibility of the prevention of whooping cough has resulted from the work of Leslie and Gardner, in England, and Sauer, in America. Leslie and Gardner, by a careful study of a number of freshly isolated and laboratory strains of *Haemophilus pertussis*, focused attention on the fact that this organism becomes degraded in type, and con-

sequently is an inefficient antigen if maintained for long periods on the common laboratory media. Sauer also emphasized the necessity for the use of freshly isolated strains that are smooth ("phase I" in Leslie and Gardner's terminology) in the preparation of prophylactic vaccines. On the basis of this work several large-scale inquiries into the practicability of prophylactic immunization are in progress in the United States of America. A similar investigation is being conducted in Melbourne, by Dr. Stanley Williams, under the auspices of the Children's Hospital and the National Health and Medical Research Council, and in cooperation with the Commonwealth Serum Laboratories. The well-planned American investigations have been conducted on a large scale over a long period; that at Grand Rapids has continued for five years and has cost upwards of £20,000. There has been meticulous attention to detail, both on the clinical and bacteriological sides, and the findings can be confidently accepted as reliable. They merit the close attention of physicians in Australia.

The progress results of the American investigations were discussed at a conference of the American Academy of Pediatrics in June, 1938.¹ In an introductory address, H. K. Faber pointed out that the ideal of complete protection of all children prophylactically immunized could not be hoped for, because, contrary to the general belief, such absolute immunity was not engendered by the natural disease. In institutional epidemics, where the exposure of children to infection is prolonged, intimate and intense, second attacks of clinical pertussis are common. In two such outbreaks, carefully studied, 31% and 100%, respectively, of children who had a clear history of a prior attack of whooping cough suffered from the disease a second time. In ordinary circumstances, when the exposure to infection is much less intense, second attacks are rarer, but by no means unknown. An immunized child, therefore, should not be needlessly or recklessly exposed to infection. Bearing these facts in mind, Faber considers that the immunity conferred by phase I vaccine in effective dosage approximates that resulting from the natural disease. The findings of the Grand Rapids investigators, Kendrick and Schermerhorn, support his belief. Of 2,000 immunized children, 295 were subsequently exposed to infection, and 40 (13.5%) contracted pertussis. Of 2,000 non-immunized children, 358 were similarly exposed to infection, and of them, 270 (75%) contracted the disease. Half of the affected patients in the vaccinated group neither whooped nor vomited, the diagnosis being established by bacteriological examination. A further 25% had only an occasional whoop or vomiting bout, and no constitutional symptoms. Therefore, of the members of the vaccinated group who contracted the disease, 75% had very light or light infections, as compared with only 21% of the control group. Practically identical results were obtained in two

¹ *The Journal of Pediatrics*, August, 1938.

investigations in San Francisco, involving smaller numbers of children. It is worth noting that in one of the San Francisco investigations a group of children vaccinated with a proprietary preparation, "Undenatured Bacterial Antigen", were not protected, 28 of 34 exposed to infection contracting pertussis, while of a similar group treated with phase I vaccine, only 6 of 34 were infected. It appears that complete or substantial protection may be expected in about 95% of vaccinated children. Faber regards these results as approaching those obtained in prophylactic immunization against diphtheria.

The question then arises whether it is worth while to administer vaccine to known contacts of pertussis, familial or other, who are likely to be incubating the disease. The Grand Rapids findings indicate that some protection is afforded by this procedure, only 34% of contacts so treated contracting the disease, as compared with 82% of the controls. An alternative method of protection of such directly exposed children is the administration of convalescent human serum. In a group of children, under five years of age, the results obtained by this method were comparable with those obtained from the children who were given vaccine; 27% of the passively immunized children contracted pertussis, in comparison with 82% of the controls. In a small selected series of eleven babies, under one year of age, the results with convalescent serum were promising. Nine of the babies given serum early did not contract pertussis, one suffered a light attack, and one mild typical pertussis. In the control group of five directly exposed babies who were not given serum, three contracted severe pertussis (two being critically ill), one contracted typical pertussis, and one escaped.

Prophylactic immunization against whooping cough is a practicable and desirable procedure. The consensus of opinion is that a total dose of not less than 80,000 million phase I organisms should be given in three or four injections at intervals of a week. Immunization may be undertaken when the child is aged about six months or more. Similar vaccine treatment of contacts, aged more than one year, if instituted as soon as possible after exposure, has a reasonable chance of preventing the development of clinical symptoms. For babies under one year exposed to infection, passive immunization with convalescent serum is probably the treatment of choice, though this might possibly be combined with active immunization. The American workers find that neither vaccine nor serum is of any use once clinical symptoms have appeared.

RHYTHM IN EPILEPSY.

G. M. GRIFFITHS AND J. T. FOX have recently reported the results of a study of fit rhythm occurring in 110 boys and men at the Lingfield Epileptic Colony, Surrey.¹ The fits recorded included all

major attacks and minor attacks involving loss of consciousness. It was at once apparent that in many instances fits, either single or multiple, occurred at regular intervals. The common monthly or menstrual rhythm is not confined to women. Some male patients showed an equally regular periodicity. Shorter rhythms were equally obvious. Rhythmic increases and decreases in the duration of the free interval were also demonstrated. No patients were discovered with a weekly rhythm. The authors conceived the idea that this unexpected finding was related to the routine of institutional life, and endeavoured, unsuccessfully, to correlate fit periodicity with that of fear, boredom and anxiety (especially boredom), which might be expected to recur at certain phases of the week's programme.

Careful attention was paid to the time of day when fits occurred. The greatest incidence in the whole series took place at the hour of rising, 6 a.m. to 7 a.m. The next most popular time was between 10 p.m. and midnight. The "rising fitters", as Griffith and Fox term them, are a particularly intelligent group. The authors agree with others who have made similar studies, that sleep is the most important factor in the determination of peak times. Fits occur either an hour or so after the onset of sleep, when slumber is deepest, or during the early morning transition from deep to light sleep or wakefulness, or just after rising. Hypoglycaemia and the assumption of the erect posture have been proven to be inadequate explanations for this. Alterations to the usual hours of sleep produce corresponding alterations in the peak times. Observations were also made upon the effect of drugs on the time rhythm. In some cases no effects upon the hour incidence were noted, but usually profound changes occurred. Phenobarbital was shown to be the most prompt and effective drug, producing a delay in the appearance of the anticipated seizure. In clinical work it is therefore very important to give this drug just before the time when fits are expected. Bromide does not often affect the time rhythm, and it appears to have its greatest effect during the second twelve hours after its administration. The authors have the impression that it does not matter greatly what time of day the drug is given. Sodium baborate is much more uncertain, and sometimes lessens, sometimes increases, the number of fits. Borax, like phenobarbital and bromide, can scatter a well-defined peak. This may not always be desirable from the patient's standpoint. Chloral was also useful and satisfactory. Other drugs, such as calcium, iron and manganese, were also shown to scatter time peaks.

The significance of this study is considerable. Unless the particular rhythm of a patient is closely studied, a mass of careful biochemical data may, and indeed has been, rendered valueless. Also individual therapy must be prescribed at such times as appear from a study of the particular inherent time rhythm of each patient's epilepsy before any drugs at all are introduced.

Abstracts from Current Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Diphtheria in Infancy.

PAUL L. FAN (*The Chinese Medical Journal*, August, 1938) makes a brief survey of the literature of diphtheria in infancy, and reports an infection in an infant who recovered. He comments on the frequency of diphtheria in China and on the absence of any reported case in an infant under one year of age. His patient was aged four weeks, and suffered from nasal discharge, fever and vomiting, and membrane was discovered on the tonsil, spreading to the pharyngeal wall and uvula. Diphtheria bacilli were recovered and proved virulent. Ten thousand units of diphtheria antitoxin were given intramuscularly, and in four days the throat had healed, although the cultures were still positive. The patient was well and gaining weight two weeks later. The author comments on the grave prognosis of pharyngeal diphtheria in infants, contrasted with the favourable prognosis in nasal infections. He also remarks on the necessity for virulence testing in identification of the organism, owing to the frequency of the presence of diphtheroid bacilli in the nasal cavity.

Diphtheria Gravis Bacteriemia.

H. C. LING, L. GREENE AND S. L. PAU (*The Chinese Medical Journal*, August, 1938) report two cases of diphtheria in which the organism was cultivated from the blood. In the first case the patient, aged twelve years, had severe diphtheria followed by myocardial degeneration, which was manifested by the occurrence of complete heart block. The organism was grown from the blood during life and gave the fermentation reactions of the *gravis* type. The patient died on the fifth day. In the second patient severe laryngeal symptoms made a tracheotomy necessary, but there was so much membrane below the opening that the cyanosis was not permanently relieved and the patient died within forty-eight hours. Blood culture taken from the heart at autopsy gave a growth of virulent *gravis* bacilli and a non-hemolytic streptococcus. The authors comment on the absence of the usual *post mortem* invaders from the cultures, as these two were the only organisms recovered.

Vaccinia Virus and Antiserum.

M. H. SALAMAN (*British Journal of Experimental Pathology*, June, 1938) has made further studies on the combination of vaccinia with anti-vaccinal serum, and the action *in vitro* of neutralizing antibody on the elementary bodies. Having observed

that in a mixture of the two, just neutral on injection, a small part of the antibody was bound to the virus but the major part was free and recoverable, and that the virus freed from this antibody was still infective, the author assumed that an essential part of the neutral mixture was free antibody. While the actual fact of infectivity was known, it was thought to be useful to discover whether there was any quantitative alteration in that infectivity. Experiments were therefore devised to determine this fact. These experiments comprised the use of constant amounts of serum mixed with serial dilutions of virus, and the measurement of the lesions produced in rabbits by injections of equal doses of each dilution of virus. A reduction in infectivity of the virus was found, which persisted after all free serum had been removed, and which was not due to agglutination of the elementary bodies. In no case was complete inactivation shown, even after separation from a mixture in which there had been a large excess of antiserum, so that the effect was not a direct effect on the virus. The results were in accordance with the theory that had been put forward for other serum virus mixtures, that under constant conditions a given quantity of antiserum inactivates a constant percentage of any dose of virus upon which it acts. The suggestion is made that the free antibody may act by suppressing the proliferation of the virus or by rendering it more susceptible to phagocytosis.

Plasmodia in Reticulocytes.

ROBERT HEGNER (*American Journal of Hygiene*, May, 1938) has made observations on the relative frequency of ring stage plasmodia in reticulocytes and of mature erythrocytes in man and the monkey. The three varieties, *Plasmodium vivax*, *Plasmodium malariae* and *Plasmodium falciparum*, were studied in general paralysis treated by malarial therapy, and *Plasmodium knowlesi* was studied in a rhesus monkey. In all cases it was possible to take blood at a known period in the life history of the parasite, and the films were stained with brilliant cresyl blue followed by Giemsa stain. In *Plasmodium vivax* infection it was proved that 89% of the parasites were found in reticulocytes whose diameters were larger than the normal red cells, and that the cell was large because it was young, not on account of the presence of the parasite. It was also shown that these reticulocytes matured in the space of twenty-four hours, as shown by the disappearance of the reticular material. In *Plasmodium malariae* infections the parasites tended to infect the mature erythrocyte, although a small number was also found in reticulocytes. In *Plasmodium falciparum* infections the parasites were smaller and tended to infect the mature red cells. In *Plasmodium knowlesi* infection in the monkey there

was a balance between the number of parasites in reticulocytes and mature red cells. The author suggests that the tendency of the parasite to invade mature erythrocytes would make the growth and multiplication of the parasites easier than when they chose reticulocytes, and would make the type of infection heavier and more severe, and might afford an explanation of the higher percentage of parasites in the peripheral blood in tertian infections. Correlation was also sought between the factors producing an increase in reticulocytes and those producing a relapse in benign malaria.

Sulphanilamide and Gonococcal Infection in Mice.

ALFRED COHN AND LEONORE R. PETER (*Journal of Infectious Diseases*, July-August, 1938) have continued their work by infecting mice with an intraperitoneal injection of gonococci suspended in 1% dextrose and 5% mucin. They describe the preparation of the suspension, and show that the addition of dextrose enhances the virulence of the organism for mice. Some strains of gonococci, however, were found to fail in their effect on mice, in whatever doses they were used. The course of the infection was followed by washing out the peritoneal cavity with physiological saline solution two and four hours after the injection, and by making blood cultures. It was found that animals so treated recovered, although they had gonococci in the blood stream at the time of the washing. If the washing was deferred six hours after intraperitoneal inoculation the animals died, even though in some instances the heart blood was sterile. The organisms were thought to be absorbed from the peritoneal cavity, as their numbers increased steadily during the first six hours. Similar results were obtained in a series of mice whose spleens had been removed. Protection by sulphanilamide was obtained both by feeding and by subcutaneous injection of the drug, but it was noted that much larger doses had to be given in the feeding experiments. When doses comparable with those given to human beings were used, complete protection was obtained in only about 60% of animals.

Minute Hemolytic Streptococci.

PERRIN H. LONG AND ELEANOR A. BLISS (*Journal of Infectious Diseases*, January-February, 1938) have continued over a period of three years their studies of minute β hemolytic streptococci. The minute streptococci were found in 12% of throat cultures from normal persons; these also yielded ordinary β hemolytic streptococci on at least one occasion in 23% of cases. In ward patients with chronic diseases a single swabbing revealed but scanty incidence, while in children under twelve years of age a comparatively high incidence was found. Patients suffering from acute

upper respiratory infections, in which the haemolytic streptococcus was not the causal organism, seldom harboured these organisms in their throats. In a group of rheumatic patients, 30% of throat cultures yielded ordinary β haemolytic streptococci, while in 55% the minute variety were found. When the rheumatic process was active, the minute organisms were much more numerous than in cultures from patients in the quiescent stage. In a group of nephritis cases with a history of acute infection before the onset of nephritis, 69% of throat swabblings showed ordinary β haemolytic streptococci, and 96% yielded the minute organisms at one time or other during the illness, while in patients who had recovered from this type of nephritis, the incidence of the organisms was normal. In patients suffering from nephritis with insidious onset, which was slowly progressing to a fatal termination, the occurrence of both types of organism was only slightly greater than in the normal group. In a group of patients with renal injury due to miscellaneous causes the incidence was within normal limits. The findings in acute nephritis of the first type suggested that there was a causal relationship in the presence of the haemolytic streptococci, and the findings in rheumatic fever and its complications were thought of importance in view of the present opinions of the aetiology of acute rheumatism.

HYGIENE.

Lactobacillus Acidophilus and Dental Caries.

PHILIP JAY (*American Journal of Public Health*, June, 1938) states that there was a low incidence of dental caries in a group of children receiving a diet deficient in vitamins and minerals, but almost sugar-free. With large amounts of sweets in the diet new caries soon appeared. Specimens of saliva for bacteriological examination were collected in the following way. Paraffin was chewed and the saliva was spat into a sterile tube. It was incubated on tomato agar and the number of *Lactobacillus acidophilus* colonies was estimated. In severe dental caries the author advises that carbohydrate, such as cake, pie, sweetened desserts and ice cream, should be moderately restricted. After a fortnight the count of *Lactobacillus acidophilus* colonies should be much less. If they are not less, the restrictions should be increased. Occasionally a diabetic diet high in fat may be given. Active caries was arrested in 80% of cases. In a few, drastic dietary treatment failed to reduce the lactobacillus overgrowth. On the other hand, about 3% of the children seemed immune to dental caries. Their cultures contained no colonies of *Lactobacillus acidophilus*, even when they were consuming an excess of

sweets. The author states that neither the ensuring of nutritional adequacy nor the giving of mineral and vitamin preparations will arrest dental caries, but that restriction of carbohydrate is effective.

Haemolytic Streptococci in Milk.

J. M. SHERMAN AND C. F. NIVEN (*The Journal of Infectious Diseases*, March-April, 1938) have examined 245 pasteurized and 68 raw samples of milk for the presence of haemolytic streptococci. The Lancefield technique was used for identification. Haemolytic colonies were present in cultures made from all samples of raw milk, but only the "wide-zone" colonies were examined further, and these were present in 28%. Of the samples of pasteurized milk, only 8.5% yielded "wide-zone" colonies on culture. In all cases the cocci numbered less than 1,000 per cubic centimetre, and with few exceptions were heat-resistant. Organisms of the enterococcus group were present in the pasteurized milk and not in raw milk. These belonged to Lancefield's group D. The commonest organisms were those of group B and C (Lancefield). Three strains were isolated which did not conform to any recognized group and were called "haemolytic viridans". Fibrinolytic tests were carried out on all strains. It was found that these last-mentioned cultures gave similar results at 37° C. and at 54° C. for four hours, but that changes did occur when the tests were carried out over longer periods, and that partial lysis could be demonstrated. Extensive fermentation tests were carried out, and also the hydrolysis of sodium hippurate, as the streptococci of group A (Lancefield) are inert in this respect. The survey showed that the commonest streptococci in raw milk were those of the "animal pathogen group", while the pasteurized samples contained the heat-resistant enterococcus group.

Certain Metabolic Diseases and Climatic and Socio-Economic Factors.

L. P. HERRINGTON AND I. M. MORIYAMA (*American Journal of Hygiene*, November, 1938) state that a high average intercorrelation and a consistent relationship to climatic and economic factors justifies the grouping in a "metabolic panel" of *diabetes mellitus*, exophthalmic goitre, Addison's disease, leucæmia and pernicious anæmia. All agree in common geographic gradient from low values in the south-south-west to high values in the north-north-east in the United States of America. In diabetes, urbanization, population density and value of products gave high correlation figures. This agrees with Joslin, who ascribes high figures to occupational status and nutritional habits associated with urban life and prosperity. Sedentary and inactive occupations supply a high proportion, while 75% of patients are overweight. The economic factors

represent two-thirds, the climatic only one-third of the effects. Seasonal variations show higher death rates in cold weather, largely owing to the intercurrent respiratory infections of the winter rather than to any stimulation of metabolism by cold. The number of patients who die after fifty years of age (70%) confirms this. Winter effect also tends to cut down exercise and increases appetite. Pernicious anæmia and leucæmia show even higher values in the rural central and north central States, rising with prosperous rural as opposed to the prosperous urban conditions of diabetes. Cold unstable climates favour the former, relatively stable cold the latter. Exophthalmic goitre differs more from the average, fitting in with normal temperature, weather instability and yearly temperature range, and combines most definitely with urbanization. The tendency has been to associate exophthalmic goitre with tense city life and an emotional background. The authors found it conspicuously associated with the inland central and Great Lakes region, a distribution similar to that of colloid goitre together with urbanization. Cold weather instability and a smaller annual range of temperature influenced high rates, the dominant emphasis, however, being geographic rather than climatic. Addison's disease showed least effects, though generally similar to the rest of the group, colder climates showing increased rates.

Elimination of Bacteria from the Mouth.

J. L. T. APPLETON, HENRY KLEIN AND CARROLL T. PALMER (*American Journal of Hygiene*, September, 1938) have studied the elimination of *Bacillus prodigiosus* from the mouth. Three human subjects were used. After the mouth had been proved free from the test organisms by similar cultural methods used throughout the study varying amounts of the organism were added to a stated quantity of mouth rinse, which was retained in the mouth for one minute; then over a stated period of time the subject, as far as possible, kept the mouth closed. At the end of the test period a single culture was made from a rinse with two cubic centimetres of tap-water and the results of the tests were recorded. On the three subjects 590 tests were made. A definite relationship appeared between the number of bacilli inoculated and the length of time taken to prove by cultural methods that the organisms were absent; but the actual times varied in the individual subjects. It was proved that the test organism did disappear from the mouth, and that it was not the saliva which was the effective agent. No information was gained, however, as to the specific factors involved. The accuracy of the method was such that an estimated dose of four bacilli in two cubic centimetres of rinse could give a positive culture in a short period of time.

British Medical Association News.

MEETING OF THE FEDERAL COUNCIL.

A MEETING of the Federal Council of the British Medical Association in Australia was held at 2 p.m., Monday, December 12, 1938, at the British Medical Association House, 135, Macquarie Street, Sydney, Sir HENRY NEWLAND, the President, in the chair.

Representatives.

The following representatives of the Branches were present:

New South Wales: Dr. George Bell, Dr. W. F. Simmons.

Queensland: Dr. T. A. Price, Dr. C. E. Wassell (as substitute for Dr. D. G. Croll).

South Australia: Sir Henry Newland, Dr. A. F. Stokes.

Tasmania: Dr. W. E. L. H. Crowther.

Victoria: Dr. F. L. Davies, Dr. J. Newman Morris.

Western Australia: Dr. N. M. Cuthbert (substitute for Dr. D. M. McWhae), Dr. D. D. Paton.

Dr. W. E. L. H. Crowther acted as proxy for Dr. S. Gibson.

Minutes.

The minutes of the meeting of June 30, 1938, copies of which had been sent to members, were taken as read and were signed as correct.

Appointment of General Secretary.

Dr. J. G. Hunter was reappointed General Secretary for a period of one year as from September 30, 1938.

Annual Report.

The annual report as submitted was amended and adopted.

Finance.

Congress Fund.

The question was discussed as to the manner in which the surplus funds of the Australasian Medical Congress (British Medical Association) could be used (for example, for grants for research work *et cetera*), and it was decided that the Honorary Treasurer be asked to seek advice and assistance in order to report to the next meeting as to the objects and uses of the congress funds.

A copy of the New South Wales Branch balance sheet was forwarded to the Federal Council, some of the funds of congress being invested in the debentures of the New South Wales Branch house.

National Health Insurance Emergency Fund.

The Honorary Treasurer explained the position of the National Health Insurance Emergency Fund, and stated that it was estimated that a further £4,500 would be required from the Branches to meet future expenditure. A discussion then ensued and it was decided:

That the balance sheet of the National Health Emergency Fund be presented to each Branch and that the Branch be advised: that the Federal Council is concerned with regard to the availability of sufficient funds to meet the legal expenses of presenting the case before the Royal Commission on National Insurance; that it is necessary for each Branch to transmit an amount which, with amounts already sent, will be equivalent to £3 for each member; that the Federal Council earnestly requests each Branch at once to use every endeavour to bring contributions up to this *per capita* amount.

That the Branches be advised that it is estimated that the legal and other expenses will be at least £13,000.

Proposed Amendment of By-Law 15 (iii).

Notice of motion was submitted by Dr. W. F. Simmons, seconded by Dr. George Bell, as follows:

That By-Law 15 (iii) be amended by the deletion in the last line thereof of the word "two" and the substitution in lieu thereof of the word "ten", so that the by-law will read: "To meet the general and other expenses of the Federal Council the treasurer of each Branch shall pay to the Federal Council such sum or sums as the Federal Council may require, provided that the total so payable in any year shall not exceed a sum equal to ten shillings per member of the Branch".

In the discussion it was pointed out that, with any increase in the activities of the Federal Council, it would be impossible to carry on the necessary organization efficiently with the present income, having in mind particularly the request made by the Federal Council to the Parent Body for greater autonomy in Australia.

It was therefore decided, in view of the fact that some of the Branches were opposed to the alteration of the by-law, to refer the matter back to the Branches with the recommendation that the minimum contribution per member from each Branch be ten shillings.

Tenth Australian Cancer Conference.

A letter was received from the Director-General of Health of the Commonwealth, asking the Federal Council to appoint representatives to the Tenth Australian Cancer Conference, to be held in New Zealand in February, 1939. It was decided to invite Dr. B. T. Edye (Sydney) and Dr. S. V. Sewell (Melbourne) to represent the Council.

Doctors Required in Western Australia.

The British Medical Association wrote to the Federal Council in regard to a letter which it had received from the Government of Western Australia in reference to the difficulty in obtaining medical officers for various positions in the State, and attributing such difficulty to a shortage of doctors, and inquiring whether, if there were an excess of qualified practitioners in England, there would be any reasonable chance of securing the services of any of them for Western Australia. In a letter to the British Medical Association it was pointed out that at the present time there were attending the medical schools in Australia approximately 2,000 students; that recently 103 students had graduated from the University of Sydney and a similar number would graduate from the University of Melbourne, and that in 1940 the University of Queensland would turn out its first medical graduates, probably about 30 in number; and that therefore the present output of medical graduates from Australian medical schools would be sufficient to meet all Australian needs, provided that the conditions offered were sufficiently attractive. The trouble really was that the conditions were not sufficiently attractive to induce young graduates to take up positions in some of the country areas, a fact which applied not only in Western Australia but in all the other States.

Subscription of Transferred Members.

A motion moved on behalf of the Queensland Branch, as follows, was approved, namely:

That members transferred to another Branch on or after January 1 in any year pay their subscription to their original Branch, which Branch shall pay for their journals for that year.

Writing of Prescriptions.

The Federal Council was asked by the Victorian Branch to consider a letter which had been written to the Branch by a pharmacist in regard to the writing of prescriptions. The pharmacist drew attention to recent accidents that had happened, and inquired whether it would not be possible to alter the symbols at present in use for drachm and ounce respectively. It was decided, with a view to preventing mistakes in dispensing illegible prescriptions, to communicate with the Pharmaceutical Council of Australia to ascertain its views.

British Medical Association.**Official Status of Federal Council at Annual Meetings.**

The British Medical Association agreed to a request by the Federal Council that the Council be officially represented at annual meetings of the Association. It was noted that Dr. D. M. McWhae attended as representative at the annual (1938) meeting at Plymouth.

Scholarships and Grants.

Two applications were received and were forwarded to headquarters in accordance with the arrangement entered into between the British Medical Association and the Federal Council.

Organization of the Profession in Australia.

In reply to the representations of the Federal Council that the Central Council amend its memorandum, articles of association and by-laws so as to give to the profession in Australia greater autonomy, the Federal Council was advised that at its meeting in June, 1938, the Council of the British Medical Association passed the following resolution, namely:

That the Council take power to vest in incorporated Federal councils and in councils of corporate groups of Branches powers in all or any respects similar to those exercisable by the British Medical Association Council; in cases where the area of a Federal council includes incorporated Branches, the Federal council to have power similarly to vest all or any such powers in the council of an incorporated Branch.

It was pointed out by the Council of the British Medical Association that some of the difficulties that confronted the profession in Australia did not arise from any defect in the existing constitution of the Association or from a lack of autonomy under the constitution, but from the existing powers of the Federal Council, inasmuch as that Council was mainly a coordinating and advisory body, the executive power being retained by the Branches themselves. The Council intimated that it was anxious to take every possible step to meet the desires of the Federal Council, and accordingly had discussed the constitutional position with counsel, who advised that, under By-Law 26, overseas Branches already possessed very full autonomy, but that, with a view to effecting complete autonomy on the lines now suggested, special provision would have to be made in the articles of association. The Federal Council, therefore decided:

(1) That the Branch councils be asked to consider and report to the Federal Council as to the desirability of altering, and to what extent, the Articles of Association of the Federal Council, Article 3, with a view to obtaining greater autonomy than at present possessed for the Federal Council of the British Medical Association in Australia.

(2) That the Federal Council is of opinion that, in order effectively to organize the British Medical Association in Australia, the fullest possible executive powers be given to the Federal Council, and that the Branch councils be requested to indicate if such executive power be desirable.

That it be suggested that all Branches become incorporated bodies as a first step, and that the necessary alteration of the Memorandum and Articles of Association of the British Medical Association, the Federal Council and the Branches be made as soon as possible.

It was decided to convey to Dr. Victor Hurley and Dr. Lindsay Dey the sincere thanks of the Council for the very valuable work that they did in interviewing the officers of the Association in London and explaining the position to them.

Australasian Medical Congress (British Medical Association).**Date of Sixth Session.**

The President of the Sixth Session of Congress, Dr. D. D. Paton, advised that the date had been fixed tentatively as August, 1940; the exact date to be determined later.

Grant from Congress Funds.

It was decided to make a further grant of £200 towards the expenses of the sixth session.

Appointment of Office-Bearers of Sections.

It was arranged to request the Branches, before nominating members to be office-bearers of sections, to ascertain from such members whether they were willing to accept office.

Special Associations.

In accordance with Article 25A, approval was given to the formation of the Ophthalmological Society of Australia (British Medical Association), the first special group to be formed within the Association, the President being Sir James Barrett, and the Honorary Secretary Dr. Darcy Williams.

Federal Compensation Fund.

The report of the subcommittee appointed at the last meeting of the Federal Council to consider the question of financial assistance to medical practitioners was submitted and amended. Following the submission of the report it was decided to establish a fund, to be called the Federal Emergency Fund, the rules of which would be as follows:

1. A fund to be called the National Health Insurance Emergency Fund shall be and the same is hereby established.

2. The following are the objects of the fund:

(a) To provide or contribute towards the provision of such financial assistance as the Federal Council may from time to time deem desirable for the purpose of the protection maintenance or promotion of the interests of the medical profession in Australia or any Branch section or part thereof in relation to any legislation, proposals or dealings by or with any government or organized body in the Commonwealth of Australia which may in any way affect the members of such profession or any branch section or part thereof.

(b) To assist any individual subscriber to the fund in maintaining supporting furthering or defending any position right or claim in which he is concerned and in which the Federal Council shall have determined to support him by making a grant or grants to him from the fund for such purposes or any of them and to financially assist any individual subscriber by the like means to meet any financial loss incurred by him in or incidental to any act or thing done by him consequent on any resolution of the Council.

(c) To meet or provide either wholly or in part any expenditure incurred or to be incurred by the Federal Council or any person or body approved by it in the establishment promotion and administration of the fund or any of its objects.

(d) To provide either wholly or partly for the cost or expense howsoever arising of or incidental to the proper representation and appearance of the Federal Council or the medical profession or any part section or branch thereof before any Royal commission, court of inquiry or any like body on any dispute inquiry or proceeding dealing with or having relation to medical service under any system of contract practice or for or relating to any other matter or purpose approved by the Federal Council.

3. All members of the medical profession in Australia who are members of or are eligible for membership of any Branch of the British Medical Association in Australia shall be invited to contribute to the fund either by donation or subscription.

4. The minimum annual subscription to the fund, until otherwise provided by the Federal Council, shall be as follows: In the case of medical practitioners who undertake contract practice, £1 1s. An entrance fee of £1 1s. shall be payable, and if a member lapses, he shall pay a reentrance fee of £1 1s. Subscriptions shall be payable on the first day of July in each year or on such other date or by such periodical payments as the Federal Council may from time to time determine.

5. Special subscriptions may be accepted by the Federal Council to be used in any particular dispute or matter or to be applied to any specific method of carrying out the objects of the fund. For such purpose the subscriber may nominate the purpose for which he desires his subscription applied, but subject thereto all subscriptions shall form part of the fund and be applied by the Federal Council towards the objects of the fund as it thinks fit. If there shall be any unused balance of a subscription in respect of which a subscriber shall have made such nomination as aforesaid such balance shall become part of the fund.

6. (a) The Federal Council shall have the management and control of the fund. Save as herein otherwise provided the Federal Council may exercise in and about such management and control the same powers and authorities in all respects as it is entitled to exercise in respect of its own business and affairs. (b) All moneys subscribed or contributed to the fund shall be held in the names of any two or more members of the Federal Council appointed for such purpose by the Federal Council. (c) The Federal Council may at its discretion from time to time apply and dispose of the fund or any part thereof for or towards any one or more of the objects of the fund. (d) No payment shall be made from the fund except by the authority of the Federal Council or of any committee of the Federal Council acting under express authority in that behalf.

7. No part of the fund or its income shall belong to or be the property of the Federal Council, which shall only act in the administration thereof pursuant to these rules.

8. Except in circumstances of a special character which in the opinion of the Council warrant immediate action justifying expenditure out of the fund, no grant shall be made from the fund to any subscriber within one year of the payment of his first subscription or to any subscriber who having once subscribed to the fund shall fail to pay his subscription for any subsequent year within three months of the due date thereof.

9. Except in circumstances of a special character which in the opinion of the Council warrant immediate action justifying expenditure out of the fund no grant to an individual subscriber shall be made from the fund until the accumulated amount thereof shall have reached five thousand pounds (£5,000).

10. Nothing in these rules shall entitle any subscriber to any claim on the fund by reason of his being a subscriber.

11. These rules may from time to time be varied or amended and any further rules may be added thereto by resolution of the Federal Council.

12. The Federal Council may upon passing a resolution to that effect wind up the fund whenever in its opinion the continuance of the same is no longer justified. Any money forming part of the fund held at the time of its winding up may be applied and disposed of by the Federal Council after payment thereout of any costs or expenses incurred in or incidental to such winding up, for such purpose or purposes for the benefit of the medical profession in Australia or for the advancement of medical science as the Federal Council shall determine.

13. In these rules the words or expressions following have the meanings hereafter assigned to them respectively, that is to say: "The fund" means the Federal Compensation Fund as established by these rules. "The Federal Council" means the incorporated body known as the Federal Council of the British Medical Association in Australia. "Subscriber" means a person who has paid

the first subscription to the fund payable under these rules, and also such subsequent annual or other subscriptions as have become payable thereunder.

Alien Medical Practitioners.

The Federal Council was advised by the British Medical Association that the Secretary of State for Home Affairs was now refusing permission to foreign medical practitioners to go to England for the purpose of studying for a British qualification unless the applicant was an altogether exceptional individual or was able to show that he had obtained a definite promise of medical work in some other country.

Prevention of Blindness.

In view of the magnitude of the problem of making a survey of the blind in the larger States, it was decided to suggest to the Ophthalmological Society of Australia (British Medical Association) that an application be made to the National Health and Medical Research Council for a grant towards the expenses of carrying out such surveys. It was decided also to extend to Dr. Hamilton and Dr. Counsell (Tasmania) the congratulations of the Council on their reports.

Transmission of Infection in Puerperal Cases.

A letter was received from the Director-General of Health of the Commonwealth stating that the National Health and Medical Research Council at its last meeting had decided to invite the Federal Council to consider the recorded legal proceedings against doctors in England and to take appropriate steps to disseminate the necessary information as to the modern concept of the transmission of infection in puerperal cases and the legal liabilities associated therewith. In view of the importance of the matter it was decided to request the Editor of *THE MEDICAL JOURNAL OF AUSTRALIA* to invite the Obstetric Research Council to write an article for the journal embodying the necessary information.

Physical Fitness.

The representative of the Federal Council on the National Health and Medical Research Council (Dr. J. Newman Morris) read the pronouncement of the Research Council on the subject of physical fitness, as follows:

The Council, having regard to the increasing complexity of international relationships, is deeply concerned at the falling birth rate, particularly in Australian cities, and at the evidences presented from time to time of preventable defects affecting the general health, the bodily fitness and the national efficiency of a large part of the young people of this young nation.

The health of any nation is the health of the individuals that comprise it, and disproportionately great is the significance of ill health, for it not only removes numbers from productive life, but detaches others for their care and lays an undue burden on the remainder.

In the constant struggle for economic survival progress is determined, other resources being equal, by the relative proportions of the fit and the unfit, that is to say, in effect, the percentage of the population ineffective towards national life and survival, by physical infirmity or lack of training.

This applies not only to the continuing burden the industrious and able must carry in national and international trade and commerce, but also the handicap represented by the unfit and the untrained should the increasingly intense economic competition of today end in war.

Recent international events have brought to a sharp focus the unpreparedness of this nation in any such emergency.

It is a particular attribute of the British character that voluntary organizations have often shown themselves more ready to undertake activities essential to the welfare of the nation than governments have been to enforce them by legislative measures. Thus in the field of physical

education there are numerous bodies so engaged from the Boy Scout and Girl Guide organizations to church groups and sporting clubs and associations.

The British were first and long remained foremost in the pursuit of physical development through sport and organized play; but that easy and early preeminence has been lost by the very self-complacency it produced. The British are no longer the unchallenged premiers in any field of physical or related activity.

It is unfortunately true, moreover, that it is especially those who are most in need of physical development who are least attracted to it. The unfit are unenterprising and do not respond readily to invitations to amend their state voluntarily.

The urgency of the situation might well be thought to justify a compulsory and universal obligation in this regard.

The Council is convinced of the urgency and importance, in any case, of establishing a national organization which shall have as its main objective a standard of physical fitness such as this country, with its racial heritages, natural environment and economic opportunities, should show.

It is recognized that this is particularly a field of endeavour in which, instead of looking passively to governments to do all the work and provide money (which may or may not be well spent), the people of Australia should help themselves. Unless the voluntary ideal is proved sincere by such willingness, it may well be suspected to be a mere escape from obligations. Isolated sections of the community are already committed to this great national objective, and they are anxious to extend their activities.

Governments can direct and assist, both morally and financially, these excellent endeavours if an organized framework is established. Such an opportunity appears to have been provided by the present temper of the people.

The Council therefore recommends the Commonwealth Minister for Health:

1. To form immediately a National Council for Physical Fitness, under the Minister for Health.

2. To invite State Governments, through their Ministers for Health, to cooperate in this national objective by forming related State councils.

3. To extend the invitation to include the third element in government, namely, local government, with a view to making available, enlarging and multiplying playgrounds, sports fields, swimming pools and other tangible equipment and facilities. In this regard that encouragement be given to the formation of community committees in every district to cooperate with local authorities in the provision of local facilities directed towards the maintenance of physical fitness in the community.

4. To convene an initial conference as early as convenient and so to establish a permanent organization, periodically reviewed.

It is further recommended:

(a) That all useful voluntary bodies be invited to associate themselves to the local and central councils and be subsidized to the limit their opportunities appear to justify, for extension of membership and range of activities.

(b) That the details of programme be thus determined on a national basis on approved and progressive lines.

(c) That the Departments of Health and Education in each State be actively associated with the scheme with a view to making the personal and individual obligation in this regard universally apparent to the children of the rising generation.

(d) That where physical drill is a feature of education or training at present, it be assimilated to and alternated with organized games and that, since nothing is valuable unless attached to a purposive ideal, that this development for physical fitness be constantly associated in the minds of the children of the nation with pride in their nation's achievements here in the short space of 150 years, and with that confidence in its future which is essential if its future is to be worthy of its past.

(e) That the memorandum by Dr. E. S. Morris be printed and circulated as a separate paper for general distribution.

(f) That the need for physical education, while of most value to pre-school and school groups, is equally important for adolescent and adult members of the population.

(g) That immediate steps should be taken to ensure a sufficient supply of trained leaders and teachers.

Having heard the pronouncement the Federal Council decided: (i) to offer to the Commonwealth Government and the National Health and Medical Research Council the cooperation of the Federal Council; (ii) to draw the attention of the Branch councils to the State aspects of the movement, and to urge them to participate as fully as possible; (iii) to express the hope that the individual members of the Association in Australia will take an active interest in the promotion of physical fitness.

NATIONAL HEALTH INSURANCE.

The resolutions of the Federal National Health Insurance Committee of August 12, 1938, were adopted; and the resolutions of the Committee of November 25, 1938, were submitted, discussed and approved.

The meeting of August 12, 1938, had reference mainly to the presentation of the profession's case before the Royal Commission, and the legal advisers for the Federal Council attended and discussed various matters with the members of the committee.

THANKS.

The thanks of the Council were conveyed to the President, Sir Henry Newland, for presiding; and to the Council of the New South Wales Branch for its hospitality and for the accommodation provided for the meeting.

DATE AND PLACE OF NEXT MEETING.

The determination of the date and place for the next meeting was left in the hands of the President.

ANNUAL MEETING.

At the annual meeting of the Queensland Branch of the British Medical Association, held on December 9, 1938, Dr. Thomas A. Price was unanimously elected a Vice-President of the Branch, on the nomination of the Council, in accordance with Article number 55.

This action was taken with a view to expressing in a small degree the sincere appreciation of the members of the services of Dr. Price to the Branch and to the profession generally in very many ways during the past five years.

SCIENTIFIC.

A MEETING of the Queensland Branch of the British Medical Association was held at British Medical Association House, Wickham Terrace, Brisbane, on October 7, 1938.

PHYSICAL THERAPY.

A symposium on physical therapy was arranged.

DR. A. V. MEEHAN made some introductory remarks. He said that as his function was merely to introduce the discussion he would make no attempt to deal with any details of treatment; that would be done in the more lengthy papers of the speakers who followed. He proposed instead to make a short plea for those who took up the work of physical therapy.

At the University of Queensland a three year's course was necessary, and as well as a detailed knowledge of the practice of the various branches of physical therapy a good grounding in general science and a full course in theoretical and practical human anatomy was prescribed.

Physical therapy was a branch of treatment which was time absorbing and required infinite patience. In even a simple case a daily period of treatment, lasting for the best part of an hour, had to be given. This might have to be carried on for weeks or months. This very time element alone made it impracticable for the physician or surgeon to carry out such treatment adequately himself.

In Dr. Meehan's opinion the best results were obtained by the help of trained physical therapists, who worked under direction from the medical man and kept in frequent touch with him during the progress of treatment. Physical therapists were very well trained and they became very skilful in the practical application of their work. Dr. Meehan was afraid that sufficient use was not made of them by the medical profession, often to the detriment of the patient.

It was not a helpful experience for patient or physician when the former failed to obtain relief from a course, for example, of medical diathermy administered by the doctor or even by an inexpert attendant in the doctor's rooms. If this was followed by a course of similar treatment administered by a trained physical therapist, using a more efficient machine and knowing better how to use it, recovery would not seldom occur.

This was gratifying for the patient, but no great help to the medical practitioner. He would therefore strongly urge the members of the medical profession to make more use of the trained physical therapists. They were a devoted and extremely useful band of workers, as long as those properly qualified were chosen. They would not deal with the patient without medical direction and were most anxious to be directed in all phases of the conditions they were called upon to treat. The patient received his treatment from them at a much cheaper rate than a medical man could afford to give it, and the treatment was likely in most cases to be more efficiently given as a direct result of the vastly greater amount of practice in this work which the physical therapist had.

In Brisbane the supply of trained physical therapists was at present not adequate. This was a result of the fact that it had until recently been necessary for young people entering this profession to migrate to other universities for training. As an excellent three-year diploma course had been recently established at the University of Queensland, the medical profession could look forward within the next two years to having a constantly renewed and adequate supply of skilled workers available to help them.

Dr. HAROLD CRAWFORD read a paper entitled "Physical Therapy in Disease and Deformity of Childhood" (see page 183).

Dr. R. S. LAHN read a paper entitled "Physiotherapy and Posture, with some Remarks on Postural Anatomy" (see page 186).

NOMINATIONS AND ELECTIONS.

THE undermentioned has been elected a member of the South Australian Branch of the British Medical Association:

Wilson, Robert Kevin, M.B., B.S., 1937 (Univ. Adelaide), Renmark Avenue, Renmark.

Special Correspondence.

CANADA LETTER.

FROM OUR SPECIAL CORRESPONDENT.

The Canadian Medical Association.

THE Canadian Medical Association will hold its seventieth annual meeting in June, 1939, in Montreal. The Associa-

tion was organized in 1867, but missed a couple of meetings during the War. This gives us a fairly respectable age as these things go, but it is rather striking how very noticeable the growth of the Association has been within the last few years.

Up to 1921 we were not more than fairly well established, but from that year on things began to happen. There was a thorough reorganization, money was raised by a bond issue to set our journal on a firm footing, and although we were heavily in debt at the time, with a very small membership, faith was justified. In a few years the debts were all paid off, our membership began to rise, and the financial outlook brightened.

Even after ten years more of such growth, however, it was felt that the Association did not represent the Canadian profession adequately. Less than half of the Canadian practitioners were members of it. A movement was therefore started for further reorganization. The basis of this was to make all provincial societies (there are nine provinces) branches of the parent organization, calling them divisions. Their members would then all automatically become members of the Association. The divisions would, of course, continue to function as before in their respective provinces, but the strength of the Association would be immensely enhanced.

We have now practically completed this reorganization. Two provinces are still considering the matter, since there are various opinions as to the worthiness of the step, but it is hoped that they will join in before long.

This meeting in Montreal will be a large affair. Montreal is a good convention city, although unfortunately it lacks a good convention hall. We have nothing, for instance, like the large auditorium at Atlantic City, in New Jersey; but that, of course, is almost unique. It can stage practically any game, except perhaps polo, and at a pinch it might try that.

However, we can carry on a good meeting, and are looking forward to it. The programme committee is hard at work. One change has been made in the type of programme. In former years meetings in Montreal always made use of the large quantity of clinical material at the hospitals, by having the various sections hold their meetings at the different institutions. It is now realized that this splits up the convention too much. A great deal of time is wasted in moving from one place to the other. Even if the traffic conditions were ideal this difficulty would be considerable. Actually, as in any large city, they are far from being ideal.

We always welcome a good many visitors to our conventions. There are usually a few invited speakers from the British Isles, but the mass of the other visitors are from the United States. Many of the usual meeting places in Canada are within very easy travelling distances from the States, and the associations between the members of the profession in the two countries are very intimate.

Once we actually had a combined meeting of the Canadian and American Medical Associations. This was in 1935, at Atlantic City, and was successful enough, although, of course, our numbers were very greatly overshadowed.

Asphyxia and Resuscitation from Drowning.

Within the last few months there has been an extraordinary awakening of interest in asphyxia and resuscitation from drowning. It all started in June, 1938, when Dr. Gordon Bates, of Toronto, drew the attention of the profession to the fact that undoubtedly there were cases of asphyxia from various causes in which more persistent attempts at resuscitation would very likely have averted death. According to Dr. Bates, there was not sufficient appreciation by the profession generally of the fact that in such cases life might still be present, even though appearances were against it, and he felt sure that in some instances patients were presumed dead when actually there was a possibility that life was still present.

The result of his representations was twofold. First of all, a campaign was immediately started to impress on all practitioners the necessity to prolong resuscitation methods as long as unequivocal signs of death were absent, *rigor mortis* for instance. Cases of revival after work for several hours have been reported. Nor is only

drowning to be considered. Electric shock and poisoning by carbon monoxide are also included. In several cases of electric shock the patients were revived when the resuscitation methods were applied within one minute of the shock. When there was a longer delay in treatment only a small percentage recovered.

In the second place, investigations were begun on an elaborate scale to determine exactly what did take place in asphyxia. Curiously enough, it was found that our understanding of the pathology of this state needed overhauling. Studies of the subject were therefore started at the Banting Institute in Toronto. Experiments showed that there are two main types of drowning: (a) Those in which there is apnoea followed by swallowing of water. Distension of the stomach occurs, with vomiting and convulsions. Then comes a series of gasps, when water enters the lungs, reflexes disappear and somatic activity disappears. (b) A second type, in which there is the initial apnoea, but no subsequent gasping, so that very little water enters the lungs. Death is due to obstructive asphyxia. Intermediate types also occur.

Much emphasis is laid on the importance of the obstructive asphyxia. It was found that relatively large quantities of fluid could be put directly into the lungs, by a tracheal cannula, without significant respiratory embarrassment. But in many cases so small an amount as two cubic centimetres coming in contact with the larynx was enough to cause apnoea by severe spasm of the glottis, with fatal results. The slow heart rate noticed in most of the drowning experiments seemed to be due to vagal influences. Atropinization in such cases had beneficial results, the heart soon increasing in rate. Autopsy examinations showed the lungs to be both haemorrhagic and oedematous. In both types of drowning oedema fluid is found. The right heart was always distended, the left heart contracted and empty.

It is recommended, in view of these experiments, that adrenaline and atropine are both of value in treating the apparently drowned, the latter particularly in increasing the heart rate and decreasing the oedema of the lungs. Artificial respiration, of course, must be started at once and should be carried on even while the patient is being transported to the hospital.

One very interesting finding was in regard to the condition of the heart under conditions of experimental drowning. There have been for several years isolated observations to the effect that the heart continued to function for as long even as thirty minutes after disappearance of the heart sounds by stethoscope. In many cases electrocardiograms have been taken during the terminal stages and immediately after signs of life have disappeared, and these tracings have shown the heart to be contracting approximately normally for varying periods. Such observations have been confirmed in these experiments at the Banting Institute, and it is strongly emphasized that the stethoscope is quite inadequate to determine whether the heart is functioning or not.

Correspondence.

MEDICAL CERTIFICATES FOR INJURED PERSONS.

Sir: Commenting on my former letter under the above caption, Dr. Miller writes: "... the practitioner cannot do better than follow the customs of the courts of justice". This, in effect, is precisely what I advocated in my letter. Dr. Miller, on the other hand, really advises the practitioner to constitute himself the court and give the decision thereof.

In the matter of certification a medical man is in the position of a witness and should be bound by the laws of evidence, at least to the extent that he should be able to support in the witness box the whole of the statements of fact and opinion contained in his certificate.

Dr. Miller apparently does not understand what the word "certify" means. The Oxford Dictionary tells us that to certify is to "attest formally", and to attest is to "testify", and to testify is to "bear witness".

Dr. Miller, especially since he is a Justice of the Peace, should know that he is not permitted to bear witness or give as evidence statements relative to events he knows of only by hearsay. It is undeniable that in such cases as are the subject of discussion deliberate misrepresentation does occur, and at other times patients are unconsciously biased. As I have explained, it behoves us, for the patient's own sake, to be wary of accepting the history at its face value; grave errors in diagnosis can and have resulted from such procedure.

Certificates which confine themselves to statements of facts and opinions cannot prejudice the patient; on the contrary, should they subsequently be produced in court, their very restraint conveys at once a complete absence of bias, which has a good effect.

I can imagine just how foolish anyone could be made to look and feel by opposing counsel if he were in possession of a certificate such as Dr. Miller advocates: "... You state here, Doctor, that this man's condition was due to an accident at work. This, Doctor, is certified to as a matter of fact. Did you see the accident?" "Oh! you did not? You really did not know anything about it beyond what you were told, and yet you certified to it. May we take it that the rest of your certificate is no less and no more reliable than this. Did you see the patient at all or were you told the rest of the facts certified to by you?" *et cetera.*

Certificates such as I protested against usually result from carelessness. I do not think that many of our colleagues deliberately sign their names to more than they can really bear witness to. I do not think many will agree with Dr. Miller; he appears to have been sitting on the bench so frequently that he now confuses his functions as a J.P. and as a certifying medical practitioner.

These thoughtless certificates cause needless friction at times.

Yours, etc.,

H. LEIGHTON KESTEVEN, M.D.

Granville,

New South Wales,

January 17, 1939.

Obituary.

JOHN GORDON.

We regret to announce the death of Dr. John Gordon, which occurred on January 18 at Melbourne, Victoria.

ARTHUR JAMES MACKENZIE FARGIE.

We regret to announce the death of Dr. Arthur James Mackenzie Fargie, which occurred on January 20 at Melbourne, Victoria.

DAVID EDWARD ANDERSON BUCHANAN.

We regret to announce the death of Dr. David Edward Anderson Buchanan, which occurred on January 20, 1939, at Brisbane.

EDMUND BRUCE MORTIMER VANCE.

We regret to announce the death of Dr. Edmund Bruce Mortimer Vance, which occurred on January 21 at Sydney, New South Wales.

Proceedings of the Australian Medical Boards.

TASMANIA.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act*, 1918, of Tasmania, as duly qualified medical practitioners:

Wise, Kenneth Lauchlan, M.B., 1938 (Univ. Sydney), Royal Hobart Hospital, Hobart.
 Hayes, Robert René Costable, M.B., B.S., 1938 (Univ. Melbourne), Sheffield.
 Connell, John Fletcher, M.B., B.S., 1938 (Univ. Melbourne), Launceston General Hospital, Launceston.

Corrigendum.

We are informed that several errors have occurred in the abstract of evidence submitted by Dr. D. M. Embelton before the Royal Commission Appointed to Inquire into Matters Pertaining to National Health Insurance, and published in the issue of January 28.

At page 164, line 29, the amount "5s. 2d." should be "5s. 2 pence".

At page 164, second column, line 66, the sentence beginning "We may take it that the cases of psychosomatic illness . . ." should read as follows: "If we take the cases of psychosomatic illness as representing one-third of the chronically sick (see note at the end of this section), create for the medical profession an opportunity to carefully inquire into the causes of these complaints of the insured, and avoid fixation of the neuroses by (a) positive spot diagnosis of organic disorder, (b) amplification of this by mechanical treatment, a large amount of money will be saved to the 'approved societies' annually."

We apologize to Dr. Embelton for these errors.

Diary for the Month.

FEB. 7.—New South Wales Branch, B.M.A.: Organization and Science Committee.
 FEB. 10.—Queensland Branch, B.M.A.: Council.
 FEB. 14.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
 FEB. 21.—New South Wales Branch, B.M.A.: Ethics Committee.
 FEB. 22.—Victorian Branch, B.M.A.: Council.
 FEB. 23.—South Australian Branch, B.M.A.: Branch.
 FEB. 24.—Queensland Branch, B.M.A.: Council.
 FEB. 28.—New South Wales Branch, B.M.A.: Medical Politics Committee.
 MAR. 1.—Western Australian Branch, B.M.A.: Council.
 MAR. 1.—Victorian Branch, B.M.A.: Branch.
 MAR. 2.—South Australian Branch, B.M.A.: Council.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xx-xxii.

DEPARTMENT OF PUBLIC HEALTH, PERTH, WESTERN AUSTRALIA: Medical Officer.

MOUNT MORGAN HOSPITAL, MOUNT MORGAN, QUEENSLAND: Medical Superintendent.

ROYAL NORTH SHORE HOSPITAL OF SYDNEY, NEW SOUTH WALES: Honorary Clinical Assistant to the Orthopaedic Department.

SAINT VINCENT'S HOSPITAL, SYDNEY, NEW SOUTH WALES: Clinical Assistants.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Honorary Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

Editorial Notices.

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